Abstract Book for the 36th PCSI Annual Conference

Table of Contents

Workshops

Tuesday Morning

Workshop 1: Key Success Factors for Casemix Implementation - How Respecting National Factors, Engaging Professional Cultures and Inspired Leadership Make Casemix a Key Factor in Creating a Better Health System

FACILITATORS: Jana Wahl – University Clinical Centre Ljubljana, Manal Al Khalifah – National Casemix Center of Excellence KSA, with co-presenters TBA

WHO WILL BE INTERESTED? Delegates involved in the implementation and maintenance of casemix systems, including decision makers, IT staff, researchers and anyone collecting or using patient data.

WORKSHOP OBJECTIVES: The workshop will aim to:

- summarise the theoretical framework of casemix systems
- discuss practical experiences from various countries to identify potential challenges and opportunities of casemix implementation
- identify key success factors for implementing casemix

To facilitate the sharing of experiences and advice, a SWOT analysis of some casemix implementation cases will be conducted.

WORKSHOP OVERVIEW: Healthcare systems around the world are facing rising healthcare costs, an increase in the proportion of patients with chronic conditions, higher demands and expectations, and a shortage of human resources. Effectively implementing and managing casemix systems can provide a tool to improve the quality of care and make the healthcare system work better and more efficiently if we can reap its benefits.

This workshop will explore how national factors, such as regulatory frameworks and funding models, can affect the implementation of casemix. It will also consider the role of professional culture in shaping the roll-out, adoption of DRGs and other casemix classifications, and the importance of strong leadership in driving change.

Examples of topics discussed include:

- What are the key success factors, advantages, and disadvantages of implementing casemix?
- What are the practical lessons learned from implementing casemix in different countries?
- How can the potential challenges associated with the implementation of casemix be resolved?
- What are the opportunities for improvement in health care through casemix systems?
- How can different professional groups be involved and motivated to become the drivers of change?
- Education and training models for clinical coders, an overview and example of current activities at UKC Ljubljana and other locations
- How to use data for improved hospital performance and revenue collection
- How training and coaching in countries at different stages of data quality system development can be tailored to the needs of data managers and custodians
- How negotiations, auditing practices, and disputes resolution is set up in different countries-share thoughts and suggestions
- How important charismatic leadership is in the success of casemix project

Workshop 2: Coder training accreditation and lifelong learning for retention and development of clinical coding skills

FACILITATORS: Marie Glynn and Jacqui Curley, Healthcare Pricing Office, HSE, Ireland

WHO WILL BE INTERESTED? Delegates from a range of professions, particularly coders, but also decision and policy-makers, researchers and technical staff in casemix offices.

WORKSHOP OBJECTIVES:

1. To develop an understanding of the considerations and requirements to develop accreditation of coder training in different countries with Ireland as an example.
2. To develop an understanding of the considerations and elements in providing ongoing training to the coding workforce in a range of topics relevant to their role.
3. To provide a place to share best practice and approaches to ensuring a highly skilled coding workforce is in place with a view to retention and development of clinical coder skills.
4. To identify future demands that require the development of training for the clinical coder workshop, learning from other countries about preparation for the future and how clinical coder training can be advanced to meet these needs.

WORKSHOP OVERVIEW: Following on from the workshop in Iceland this workshop proposes to look at accreditation of coder training and the development of training across a range of areas for clinical coding staff. A career in coding requires ongoing lifelong training and this workshop looks at training provided in Ireland at national level and available to all coding staff.

Topics covered include:

- Accreditation of Coder Training:
- Lifelong learning and development of coding skills
- Retention and recruitment of coders
- Future training needs for Clinical Coders

Workshop 3: Casemix – from Fundamentals to Applications

FACILITATORS: Jean marie Rodrigues - University Jean Monnet of Saint Etienne, Saint Etienne, France, Avignon Summer School Director, International Healthcare Terminology Consultant France, with co-presenters:

- Olafr Steinum MD and Classification expert, Diaqualos AB, Uddevalla, Sweden
- Jacob Hofdijk The Netherlands Foundation Partner Casemix, The Hague, Netherlands
- Kristiina Kahur, CEO Nordic Casemix Centre, Helsinki, Finland
- Deniza Mazevska, PCSI President, Health Policy Analysis, Sydney Australia
- Conrad Kobel, University of Wollongong, Wollongong, Australia
- Janette Green, University of Wollongong, Wollongong, Australia

WHO WILL BE INTERESTED? The workshop is aimed to introduce newcomers to the basics of casemix and give a taste of the schools held by PCSI. The audience is broad, from coders to decision makers.

WORKSHOP OBJECTIVES: To provide a comprehensive foundation in casemix, including to:

- Understand the origins of casemix and theoretical underpinnings
- Understand the various applications of casemix
- Describe principles for casemix funding and key design choices and implications
- Understand the impact of casemix on quality of care and use in quality improvement

WORKSHOP OVERVIEW: Each of the presenters will lead a part of the session on one of the many and varied aspects of casemix. We will start with the origins and theoretical underpinnings of DRGs and casemix followed by an overview of diagnosis and procedure clinical coding systems and terminologies that underlie casemix classifications. We will move on to cover the principles of casemix funding as well as issues surrounding the implementation of casemix systems around the world. Our workshop will include a discussion on casemix systems for integrated care.

The session will conclude with an overview of the PCSI schools.

Workshop 4: From documentation to quality: enhancing global quality measures in healthcare policy through clinical documentation improvement

FACILITATORS:

- Elric Verbruggen, MD - Solventum Health Information Systems, Belgium
- Daniel Schmithausen - Solventum Health Information Systems, Germany
- Felisha Bochantin, MS, MHA, CPC, CPC-I, CPC-H, Solventum Health Information Systems, United States
- Stephanie Cantin-Smith, RN, MSN, CCDS, IP Auditor, Solventum Health Information Systems, United States

WHO WILL BE INTERESTED?

This workshop is designed for healthcare professionals and stakeholders involved in quality management, healthcare administration, and coding. Specifically, it targets government policymakers, hospital directors, quality managers, and decision-makers, medical coders and coding auditors.

WORKSHOP OBJECTIVES:

This workshop highlights the crucial role of Clinical Documentation Improvement (CDI) in ensuring accurate and reliable quality parameters in healthcare. Participants will understand the significance of precise clinical documentation, explore best practices for CDI implementation, discuss its impact on quality metrics, and address integration challenges into existing workflows.

WORKSHOP OVERVIEW:

Through an interactive session and expert insights, participants will navigate through key topics aimed at amplifying the impact of CDI on quality metrics across diverse healthcare landscapes.

We will start by setting the stage for an exploration of CDI's pivotal role in shaping quality excellence within the healthcare sector. The session will underscore the critical link between accurate documentation practices and the attainment of robust quality measures.

A comprehensive overview of global quality metrics within P4P initiatives and governmental strategies will be presented. Participants will gain insights into the significance of these measures and the potential impact of (in)adequate clinical documentation.

Through real-world clinical case studies and best practices, attendees will discover how CDI methodologies can drive accurate, complete, and tangible improvements in quality metrics. Strategies for integrating CDI into existing healthcare frameworks to enhance data accuracy and reliability will be explored.

An interactive discussion will address the challenges and opportunities associated with implementing CDI-driven quality measures within P4P programs and government initiatives. Participants will share experiences and strategies for overcoming barriers to success.

By the end of the workshop, participants will be equipped with actionable insights and strategies to leverage CDI effectively in driving quality excellence within P4P programs and governmental healthcare initiatives on a global scale.

Tuesday Afternoon

Workshop 5: Promoting high quality cost data: strategies and lessons learned

FACILITATOR: Eileen Robertson with panel including:

- Karmen Grom Kenk, Health Insurance Institute of Slovenia
- Tina Brajnik, company Result, manages hospital business intelligence projects, works with hospital data in Slovenia
- Paula Monteith- National Casemix Office, NHS England
- Niels Hansen, Denmark
- Brian Donovan, Ireland
- One or two others TBC

WHO WILL BE INTERESTED? Anyone involved in the collection or use of cost data

WORKSHOP OBJECTIVES: High quality data is important for the effective management and functioning of health care providers and systems. Implementing new data collections such as cost data collections can be resource intensive and challenging. The benefits are not necessarily seen immediately and systems need time to bed in and produce reliable and useful data. This workshop will explore some of these challenges and explore ways of encouraging and incentivising the collection of good quality cost data. Many countries have been collecting cost data for many years but others, such as Slovenia, are at the beginning of the journey. The aim of the workshop is to share learning and experience and explore strategies and approaches that can be deployed to accelerate improvements. The workshop will also provide an opportunity to find out about costing developments in the Slovenian health system.

WORKSHOP OVERVIEW: The workshop will hear from a panel of those who have experience of implementing costing processes from both the provider and the data collector perspectives. They will reflect on their experience and consider:

- How best to implement costing (sample of hospitals or all hospitals, scope of collection, extent of top-down versus patient level), and what impact it has on uptake?
- How to engage hospitals and persuade them of the benefits in collecting and using the data for themselves
- What does good look like? Focus especially on the balance between patient level and cost allocation methods
- Key factors that helped and hindered the collection process
- Data quality and how long it took to improve
- How the benefits of the data were realised (especially for providers).

The panel will include those with experience from health systems with mature and long established cost data collections and also from those that are at the beginning of the journey. We will explore the benefits of "good enough" cost data versus the ideal. There will be a specific focus on the experience of Slovenia which is at an early stage of implementation. Representatives of local Slovenian hospitals will share their experience along with those from the Health Ministry.

As well as hearing from the panel, the workshop will include some small group discussions on the topic as a way of gathering experience and learnings from workshop attendees. We hope to conclude the workshop by identifying key strategies and ideas of how to improve data quality and improve engagement in the process with some focus on how these strategies might vary depending on the size and scale of the exercise.

Workshop 6: From Casemix to Clinics – how can we use Casemix data for clinical improvements?

FACILITATOR: Prof. Dr. med. Michael Wilke – Medical School Hamburg (MSH) with co-presenters (TBA)

WHO WILL BE INTERESTED? Case Mix officers, clinicians, quality and outcome researchers.

WORKSHOP OBJECTIVES: To discover the added value for clinical work and for the measurement of quality in healthcare systems that can be drawn from routinely collected casemix data.

WORKSHOP OVERVIEW:

In this workshop, we will learn from examples from a range of countries and discuss the ins and outs of the issues raised. We will incorporate:

- Presentations on the use of casemix data in clinical contexts
- Background information on existing methods of quality evaluation in healthcare
- Discussion to inspire participants, leading to possibilities for international collaboration

Topics that will be addressed include:

- Extending the benefits of casemix data
- Quality indicators (AHRQ, OECD, others)
- Prevalence or incidence statistics drawn out of the data
- Follow-up on local clinical improvement programmes
- Implementation of innovations
- Casemix effects of introducing new clinical practices
- Opportunities and limitations
- Are the allegations among clinical researchers real limitations or is it a question of communication culture?
- What could be done to promote multidisciplinary use of the data?
- International implications
- Where do we have data that could be used for international comparisons?

Workshop 7: Case mix costing approaches and methods

FACILITATOR: Kevin Ratcliffe, Department of Health, Tasmania, Australia

WHO WILL BE INTERESTED? Anyone whose work is in clinical costing at any level, finance, hospital management, technical aspects of casemix, the specification of costing services or the selection of costing software packages and services.

WORKSHOP OBJECTIVES:

The workshop will present costing methodology and the use of costing methods, rather than examples of specific costing software. The workshop does not reference vendors or specific software solutions. Instead, the intent is to explain how the costing process works, issues that need to be resolved and provide practical examples.

The presentation makes use of simplified Excel based models to demonstrate the major aspects of the costing process. Schemas of the costing models used and demonstrated will be provided to participants following the workshop.

Each segment of the workshop introduces the costing definitions, methods and provides practical tasks to commence or improve hospital costing activities.

WORKSHOP OVERVIEW:

Emphasis is given to establishing costing processes. Costing activities are broken down into several steps:

- Identification of scope
- Validation poof finance files
- Structure of the costing ledger; cost centres and cost items
- Comparisons of major methods
- Overhead Direct and Indirect cost allocation methods
- Ideas for implementation or improvement

Costing methods ranging from the use of external costing relativities through RVU Costing to Microcosting using local consumption data will be presented with examples of the use of these approaches, and a discussion on the rationale for the selection of the various approaches.

Workshop 8: The Health Information Management and coding workforce in an AI world: opportunities for the casemix community to set systems up for success

FACILITATOR: Jennifer Nobbs, Head of International Advisory, Beamtree, with Stephen Badham, Head of Coding and Data Quality, Beamtree

WHO WILL BE INTERESTED? Coders, clinical costing staff, decision-makers, policy makers, IT staff, researchers, academia and technical staff from casemix offices.

WORKSHOP OBJECTIVES:

- To explore what is needed from the coding and HIM community in the future to deliver on casemix policy approaches.
- Discuss how advances in technology (autocoding, etc) and "live casemix" determination will influence workforce structure and needs, reporting, performance monitoring and decision making.
- To explore what the scope, shape and skillset of the coding and HIM workforce might therefore look like in 1, 2, 5, and 10 years' time, including the critical systems and ideas that the workforce should be supporting.
- Identify risks and how to mitigate them.
- Share experiences in automation (success and failure) and collaboratively develop a list of key elements for success for recommendation to healthcare systems internationally.
- Make some recommendations to contribute to the debate.

WORKSHOP OVERVIEW: An engaged and effective Health Information Management workforce is critical to the success of casemix and value-based care. Workforce shortages and automation/AI advances present both challenges and opportunities. We need to reskill the HIM workforce to ensure they bring the most value in this environment for the benefits of health systems, patients and citizens. PCSI attendees are well placed to advise on how the HIM workforce of the future can best support this changing environment, and should contribute to this debate, including leveraging the benefits of AI and automation and navigating the associated risks.

This workshop will provide an opportunity for briefing on emerging issues, debate and information sharing, and to develop some key recommendations for discussion with colleagues when you return home. The facilitated workshop discussion will address issues such as:

- What does the current structure, scope of practice and skillset of the coding and HIM workforce look like across different countries. What are the variations and the gaps, and why?
- What do we expect to change over the next few years, and for what purpose?
- What are the next steps in different countries for developing the HIM Workforce. (reflections from participants from both advanced and emerging casemix countries) –
- Recommendations for HIM priorities from the PCSI community
    - Role and scope of practice of HIM, and ongoing training needs
    - How advances in digitisation and AI can support demands on the workforce
    - What role the PCSI community can play
- Developing metrics for success – performance management targets for a HIM department in relation to value-based healthcare: what data is required and how frequently, what are appropriate targets, etc.

Wednesday Morning

Nordic (1) Implementation, assessment, analysis (Nordcase)

Implementation of a new reimbursement system in Iceland's hospital services. Pros and cons of providing services to a small and sometimes rural population.

Gudmann Olafsson [a]

Abstract not available

[a] Ministry of Health, Iceland

Navigating the Implementation Challenges of Healthcare Reforms in Latvia

Anete Baškevica [a]

Abstract not available

[a] National Health Service of Republic of Latvia, Latvia

Costing and data analysis in Denmark

Niels Hansen [a]

Abstract not available

[a] The Danish Health Data Autority, Denmark

Diagnosis related grouping in assessing treatment measures, dental visiting patterns and examination intervals among patients to the five Public Dental Service (PDS) units in Finland.

Jari Linden [a]

Abstract not available

[a] FCG Finnish Consulting Group, Finland

Analysis of casemix data (1)

A statistical analysis on the impact of COVID-19 on hospital activity

Samuel Webster [a], Kees van Gool [a], Sarah Neville [a]

Introduction
As part of its role in setting hospital prices, the Independent Health and Aged Care Pricing Authority (IHACPA) has been monitoring changes in hospital activity, as the average cost per episode is influenced by the amount of activity that takes place within the hospital system. Changes to the average cost then have a bearing on the prices set by IHACPA.

Australia offers a unique case study into the impacts of COVID-19 on the hospital system. This is due to a small number of community cases, relative to the rest of the world, early in the pandemic, and the subsequent heterogenous incidence of COVID-19 and resulting public health responses across Australia's eight states and territories.

This work presents IHACPA's approach to understand how COVID-19 has impacted hospital activity. Specifically, we ask the question if hospital activity has or is returning to pre-COVID-19 trends. Of particular interest is whether activity in 2021-22 is different to existing trends, as this is the year for which the most recent cost data is available that will determine the next national efficient price for hospital activity.

Methods
Australia has well-established data collections which allow us to analyse historical trends in hospital activity to understand the impact of COVID-19 on hospitals, and how it has evolved since the onset of the pandemic.

Population activity for each Australian state and territory from July 2015 to June 2023 is analysed using a series of regression models. The dependent variable is the natural logarithm of monthly weighted separations across each state and territory. We employ interrupted time series analysis to examine the impact on hospital activity at the start of the pandemic on hospital activity as well as compare time trends in the pre- and post-COVID-19 eras. The model controls for lockdowns, seasonal effects, Omicron onset, and state/territory locations.

We built the model in four steps to illustrate the impact that additional variables have on our main outcome of interest.

Results
During the early phases, COVID-19 is associated with a significant decline in hospital activity, but this is primarily explained during periods where regions were in lockdown. After the middle of 2021, the impact of lockdowns on hospital activity are close to zero. Activity in 2021-22 was significantly below trend and this is partially explained by the onset of Omicron variant.

Discussion
COVID-19 related lockdowns explain the national decrease in hospital activity only shortly after the onset. While the last lock-down finished in November 2021, activity remained subdued for the entire 2021-22 year. This was somewhat explained by the onset of the Omicron wave at the start of the 2022. Growth in national activity throughput remains consistent throughout the COVID-19 era with pre-COVID-19 trends.

This work has been instrumental in developing IHACPA's approach for setting the national efficient price for hospital activity. It has allowed IHACPA to account for changes in the average cost of hospital care that are due to changes to transient shifts in activity.

[a] Independent Health and Aged Care Pricing Authority, Australia

Understanding the Complex Patient: Multimorbidity and Frailty

Kevin Ratcliffe [a]

Background
This presentation examines 2 distinct groups of complex patients who require substantial resources and represent a significant challenge to hospital service providers and funders.

The two selected groups are;

a. Patients with very high burden of disease involving a high number of chronic conditions and considered as being severely multimorbid.
b. Patients who have severe frailty.

Severely multimorbid patients represent less than 2% of the resident population yet absorb more than 20% of the total hospital inpatient cost and on any day occupy nearly 40% of the occupied overnight beds within the major public hospitals. These individuals have major ongoing health problems with significant social disadvantage and very high health care needs across all health settings.

Patients who are very frail at the episode level have several coded conditions that reflect their frailty. Those patients, while few in number, represent a group with very significant discharge delay and hospital impact. They don't share the same range of diagnosis as the Multimorbid group.

As a cohort, complex cases represent a very large cost and challenge to service delivery.

Methods/ Description of Program or Policy
This is an observational study of care utilisation and some outcomes over several years of linked hospital data.

The two groups are identified using different approaches.

For the severely frail a score is determined at the episode level based on a Frailty Risk Score developed by Gilbert et al[1] which uses ICD-10 diagnosis codes.

For the severely multimorbid, ICD coding over the prior 7 years of coding is used to identify chronic conditions in disease clusters each having an impact score. Having 7 or more chronic disease clusters and an impact score over 3 indicates a severely multimorbid individual.

Analysis along several elements has been undertaken for these groups of patients using the past 5 years of admitted data including,

- Rates of admission, Episode duration, Emergency department presentations and annual hospital stay.
- Frequency of readmission over a year mortality in episode and within the year
- Prevalence of comorbidities and types of and coexisting conditions in the primary and subsequent episodes
- Disposition rates to home, aged care

[1] Development and Validation of a Hospital Frailty Risk Score focussing on older people in acute settings using electronic hospital records: an observational Study, Thomas Gilbert, Jenny Neuburger, et al, Lancet 2018; 391; 1775-82

[a] Department Health Tasmania, Australia

Tracking and Preventing Outpatient Procedural Complications

Felisha Bochantin [a], Miki Patterson [a]

Introduction
Ambulatory care is one of the fastest growing segments in healthcare. This growth includes procedures, with an estimated 70% being performed in the outpatient setting (2017, CMS)[1]. Quality and patient safety outcomes following elective procedures performed in the hospital outpatient departments (HOPD), ambulatory surgical centers (ASC) or within physician's offices have been a blind spot to health systems, payors and regulators. To date the only available information comes from CMS OQR measure 36 for admissions 7 days after day surgery, through Hospital Outpatient Quality Reporting[2] or various counts of approximately 11 complications related to ASCs[3]. Each proceduralist may have anecdotal information of those with a post procedural complication however these results are not detailed nor aggregated at a national level.

Methods
We used over 17 million Medicare fee-for-service patients claims data from 2029-2021 to assess relative frequency of hospital based ambulatory procedures and 30-day This methodology evaluates almost 3000 procedures determined to have some risk and divides them into 115 Procedure Subgroups (PSG)s. Additionally, approximately 1200 unique complications separated into 59 complications group are evaluated in conjunction with these procedures to identify when and where potentially preventable complications are occurring. Complications were associated with procedures based on clinical relation, and timing window up to 30 days post procedure.

Results
After evaluating 17M Medicare Fee-for-Service, HOPD claims, we found an overall complication rate of 2%, with some, like hepatobiliary procedures having up to 18.52 % complication rates, and some, such as cataract procedures, as low as 0.20%. We saw a wide variation in complication rates across hospitals, not explained even after accounting for procedure complexity and patient demographics. In addition to variation by procedures and sites of service, other findings of note include reduction in infection rates associated with the pandemic, overall increase in ambulatory procedure volumes, and sweeping increases in orthopedic procedure volumes as cases were removed from the Inpatient Only (IPO) list. Identifying these ambulatory procedures and their potentially preventable complications has resulted in actionable data available to clinicians for quality and safety improvements.

Discussion
Complication rates for routine outpatient procedures were higher than generally expected. Until now there was no way of knowing how many and what type of complications were occurring following an

outpatient procedure. We believe this research could assist with policies concerning safety and quality in an area of increasing concern.

[1] 2017, CMS Financial Report FY 2017, https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/CFOReport/Downloads/2017_CMS_Financial_Report.pdf
[2] 2022, CMS Hospital Outpatient Quality Reporting Specifications Manual Release Notes Version: 16.0 QualityNet Home (cms.gov)?
[3] 2022, CMS.Gov Ambulatory Surgical Center Quality Reporting (ASCQR) Program Measures (cms.gov)

[a] Clinical and Economic Research 3M, United States

Identification of Outliers from Case-mix analysis in a Teaching hospital in Malaysia.

Mohamad Helmi Mohamad Yasim [a], Maznah Dahlui [a], Amirah Azzeri [b], Jin Ziang Tok [a], Hafiz Jaafar [b], Mohmmad Salleh Yahya [a], Nazirah Hasnan [a]

Introduction
The findings from case-mix analysis are commonly used by healthcare organizations for the strategic allocation of resources. The study on the length of stay for inpatient episodes enables the assessment of efficiency in managing the patients with the subsequent estimation of hospital beds and allows subsequent budget allocation to be done appropriately. The integration of a comprehensive case-mix system, supported by comprehension of outliers, surpasses mere data analytics in its significance. It serves as a fundamental basis for the advancement of patient-centred, evidence-based clinical pathways that align with the complex dynamics of healthcare provision.

Methods
There were a total of 48,248 inpatient episodes in the year 2022 at the studies teaching hospital, The distributions of the length of stay (LOS) for cases from various disciplines were determined and outliers were identified by applying the formula of Quartile 3 plus 2 times the interquartile range (IQR), where the IQR represents the gap between Quartile 3 and Quartile 1. This formula facilitates the identification of long-stay outliers by taking into account the upper range of the usual length of stay (LOS) and incorporating a variable threshold to accommodate exceptional instances, while short-stay outliers are characterized as admissions that necessitate only one day.

Results
The analysis of 48,248 hospital admissions in the year 2022 unveiled a significant presence of outliers, as seen by 6,272 admissions, accounting for 13% of the overall sample. The majority of the outliers (52%) were classified as long-stay outliers which exceeded the calculated LOS than the cases with the same case-mix codes. These extended periods of time spent in medical facilities they were validated by either the presence of complicated medical conditions, sophisticated procedures for diagnosis, or difficulties in ensuring smooth transfers of patient care. Another 48% of the outliers were classified as short-stay outliers which in general suggesting that these patients required only a limited period of hospitalization due to rapid recovery. However, we found that the majority of the cases were patients admitted for elective surgery which were cancelled due to various reasons, and cases that were not seen for discharge by the respective discipline's specialist at the emergency department.

Discussion
Outliers exhibit extended durations of hospitalization which arises from a combination of various variables, such as complex medical ailments, delayed diagnosis processes, and inadequacies in the management of care transitions. Determining the outliers is one of the many benefits of implementing the case-mix system for inpatient episodes. Knowing the short-stay and long-stay outliers could guide in developing a near-accurate clinical pathway for standardised and efficient management of cases. It helps to ensure appropriate use of resources and ultimately enhances efficiency in hospital management.

In conclusion, the implementation of this comprehensive strategy not only guarantees the prudent utilisation of resources but also acts as a driving force in enhancing the overall effectiveness and excellence of healthcare administration in the modern context.

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Impact of COVID-19 on Hospital Admissions: A DRG-Based Comparative Analysis in Croatia, Germany, and Australia

Karolina Kalanj [a], Benjamin Friedrichson [b], Richard Marshall [c], Jan Kloka [d], Ante Orbanić [e], Mirta Peček [f], Stjepan Orešković [g]

Introduction
The resilience of global health systems was severely tested by the COVID-19 pandemic. This crisis disrupted health services worldwide, compelling nations to balance managing the contagion with maintaining their healthcare systems' integrity. The OECD's report "Ready for the Next Crisis? Investing in Health System Resilience" highlighted key vulnerabilities during the pandemic, including underpreparedness, staffing shortages, and underinvestment. However, an improvement was noted in the availability and timeliness of health data.

The structured organization of patient data into standard groupings through the Diagnosis Related Group (DRG) patient classification system facilitates the utilization of routinely collected data for various purposes. This includes epidemiological studies, big data analyses, patient registry data collections, and the measurement of hospital activity and services payment methods.

This study aims to evaluate the direct impacts of COVID-19 on inpatient care delivery in Croatia, Germany, and Australia, based on DRG data. It seeks to identify the most affected case types and examine the potential reasons behind such outcomes.

Methods and Findings:
The study relies on publicly available data from institutions/agencies responsible for inpatient DRG data collection in the involved countries: the Croatian Health Insurance Fund (HZZO), Croatian Institute for Public Health; Institute for the Hospital Remuneration System (InEK), Independent Hospital and Aged Care Pricing Authority (IHACPA), and Australian Institute of Health and Welfare (AIHW).

The research is a retrospective, comparative analyses of the hospital admission rate accross all DRG before (2019) and during pandemic (2020-2022).

The Croatian DRG system is based on a variant of the Australian AR-DRG system utilizing a combination of the ICD 10- AM and ICD-10 classifications for the coding of diagnosis and Australian Classifications of Health Interventions for the coding procedures.

The German G-DRG system, initially based on the Australian Refined DRG logic, has evolved into a more country-specific system by adding DRG groups over the years through changes in grouping variables that reflect the local inpatient care context.

In the initial data analysis, we calculated changes in hospital admissions and observed a 21% decrease in Croatia, a 16% decrease in Germany, and a 1.9% decrease in public acute admissions in Australia in 2020 vs. 2019.

We also compared DRG classes driven by principal diagnosis or procedures potentially signalling admissions due to COVID-19, along with classes related to cancers, stroke, and mental health.

Conclusions
While Croatia and Germany followed a similar pathway in responding to the COVID-19 pandemic, the approach adopted by Australian authorities was notably different. This divergence, coupled with other factors such as geographical position, climate, and immunization rates, may explain the variations in results. The pandemic's legacy may persist for an extended period, but lessons learned from the collected data should serve as a transformative, driving force to prepare health systems for future challenges.

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[b] University Hospital Frankfurt, Goethe University, Frankfurt, Germany
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[g] University of Zagreb, Croatia

Data quality

Information Quality Advocates - action and learning progress report.

Paul Oconnor [a], Beth Reid [b], Lee Ridoutt [b]

Introduction
The objective of this paper is to up-date our work on information quality advocates (IQA) since the last conference. At PCSI Reykjavik 2022, we argued that information/data quality advocates are needed to improve the quality of the data collected and information used for decision-making[1]. The competencies needed to perform this role were discussed by the participants at a pre-conference workshop entitled 'Health care data advocacy: Meeting the skills needs of information quality advocates for the health sector'.

Since the 2022 Conference we have:

- Reported the results of the conference workshop and a post-conference search for courses[2].
- Designed a course to fill a gap for a such a course. Details of work so far will be included.
- Interviewed a selection of people to obtain a deeper understanding of the skills, knowledge and attitudes needed for the advocacy role.

Methods
A total of 30 interviews were sought with interviewees selected by senior, system-level, contacts known to the authors in Malaysia, Ireland, Saudi Arabia, Fiji, and Australia.

The interviewees were, not restricted to a particular job role or function. Our purpose was to obtain a deeper understanding of the experiences of people who already see the need for, and want to use, good quality data for the health sector. We asked these people to tell their stories and comment on the competencies needed to fulfil the advocacy role.

The interview schedule included mostly open-ended questions. We were especially interested in how they acquired their skills and which parts of their development process contributed the most (and least) to their success.

Results
Interviewee background and workplace function will be described including their career pathways and how they acquired their skills and knowledge.

The results will be compared to the key competencies for an IQA found in previous studies. Of particular interest is their experience in leadership and working with stakeholders. Their input from lived experience will be used to augment the available literature.

How successful were they in engaging 'partner' level stakeholders in on-going collaborative interventions to achieve improved data quality? What were the barriers to stakeholder involvement.

While good governance arrangements could be a facilitator of data quality improvement, other forms of informal partnership action could be effective if the 'team' was well led. Leadership skills are critical, especially for middle or upper-middle management roles. Leading in such contexts is a likely current competence deficit.

Conclusions
Our proposed course will be modified to reflect the experiences of the interviewees especially through the development of realistic (although anonymous) case studies. Creating opportunities within any learning experience for IQAs to teach each other how to resolve very practical barriers to progress is perceived as critical.

Next steps include finalising and offering an online course globally through a community of practice learning approach.

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A national pathway to data improvement: empowering healthcare services to improve their own data in the Kingdom of Saudi Arabia (KSA)

Jennifer Nobbs [a], Sharon Roumanos [b]

Introduction
KSA is undertaking a national reform programme to improve healthcare quality and efficiency, including Diagnosis Related Groups (DRGs) implementation. The Saudi Health Council and National Health Information Center (NHIC) have an overarching role, working with public and private sectors to ensure hospitals operate in adherence to performance and quality standards. High quality coded data is a fundamental requirement to measure health services' clinical and cost-effectiveness. The Center for National Insurance has already undertaken important work to improve data quality at Ministry of Health (MoH) hospitals; however, as DRG implementation expands to other sectors, broader engagement is required.

In 2023 the Australian company Beamtree and Saudi company Lean collaborated with NHIC on a Proof of Concept for data quality improvement to assess accuracy of activity data in terms of clinical coding and impact of variable data quality on cost allocation and funding beyond MoH services; and engage hospitals in preparation for ongoing data monitoring. This presentation will discuss the project's aims, results and conclusions in the context of KSA's data quality strategy.

Methods
This involved a retrospective analysis of up to 12 months' admitted acute data from ten hospitals across public and private sectors to ensure broad engagement and understand differences in data quality and varying incentives for different parts of the system; and assess accuracy, complexity and resource allocation impacts of and variation in coded data. Data was analysed to Australian and Saudi standards, including:

- Application of PICQ(r), Beamtree's proprietary tool to measure compliance with coding standards, accuracy and specificity of coding and DRG reporting

- Assessment of resource allocation impacts
- Accuracy of 'myocardial infarction as cause of death' data - a priority area known for inconsistent reporting
- Diagnosis reporting trends - where these are used for system planning and funding and may not represent actual care provision

Results
There was significant variability in data quality, with some hospitals reporting high error rates impacting DRG assignment. Where there were errors, the data generally lacked expected codes and specificity, likely undervaluing cost of care. In sectors where DRGs are not yet required for national reporting there was very limited 'grouping' of data, which would be beneficial to hospitals in understanding impacts of poor quality data.

Conclusions
Three priority areas are recommended for hospitals:

- Full data reporting: hospitals should focus on reporting 100% of admitted acute activity.
- Data formatting and submission: hospitals should identify missing data fields and standardise data submission for efficiency and to avoid disadvantaging some in national analysis and decision-making.
- Coding quality: supporting clinical coders with quality assurance and training tools would provide them with education and feedback to address errors prior to submission. It would also help to identify clinical documentation issues, enabling targeted training and manual audit.

NHIC is developing a new national platform to monitor, verify and measure application of coding across KSA, linking with health entities and national databases. This will provide both an incentive for hospitals - particularly those outside of the Ministry of Health - to focus on the areas above, and to monitoring progress in this.

[a] Beamtree, United Kingdom
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Working with national clinical audits to improve clinical documentation for coding - examples from Ireland.

Jacqui Curley [a], Marie Glynn [b], Helen Nolan [c]

Introduction
In Ireland, as with most countries, one of the main challenges in coding is the variation in the quality of clinical documentation and how to address this. This challenge impacts on the quality as well as the timeliness and efficiency of HIPE coding.

The Hospital In-Patient Enquiry (HIPE) collects activity data on admitted patients in public hospitals in Ireland. The Healthcare Pricing Office (HPO) manages this data set including the provision of training for HIPE coders along with data quality and audit functions. There are approximately 320 HIPE staff nationally including HIPE coders and Managers and there is a national HIPE portal data entry system developed in-house for data entry and reporting.

The HPO works closely with the National Office of Clinical Audit (NOCA) as HIPE data is utilised by a number of the audits managed by NOCA including the National Audit for Hospital Mortality

(NAHM), Irish National Audit of Stroke (INAS), Irish Heart Attack Audit (IHAA), Irish National ICU Audit. Through this collaboration the HPO has identified areas where there is support and engagement for improvement of clinical documentation.

Methods
The engagement to improve clinical documentation through collaboration with NOCA and the vaarious audits includes the following methods:

- Audit co-ordinators- hospital level

For some audits such as INAS there is a NOCA audit contact in each hospital - this provides an opportunity for local HIPE teams to engage directly where there is a coding query or a documentation issue.

- Audit Managers - national level:

Each audit has an Audit Manager in NOCA and the HPO collaborates with Audit Managers where there may be a query on the HIPE data in relation to an audit finding or a data quality query. The HPO can review data and perform chart based audits where necessary and these may identify a documentation issue that can be addressed through the clinical audit.

- Education and Awareness - Local and national:

Where appropriate NOCA's audit reports raise any issues related to clinical documentation and the impact of the variation in on the coding of the data. NOCA audit staff have presented to HIPE coders at HPO training courses and provide information and expertise on dealing with documentation queries. HIPE staff inform the NOCA teams of the challenges they face on the ground.

Results
The HPO has performed a number of reviews related to NOCA audits where chart documentation has been identified as an issue for example

- documentation of STEMIs and NSTEMI's
- documentation of palliative care
- sequencing of diagnoses such as heart failure
- Variation across sites due to local instructions from clinicians to coding teams

Working with NOCA these issues are highlighted and local steps taken by the individual sites to address the issues identified.

These reviews have also identified a need for clinical teams and coding departments to communicate particularly around coding guidelines for sequencing, principal diagnosis and additional diagnoses definitions.

Conclusions
The collaboration with the various NOCA audits has brought clinical focus onto the importance of clinical documentation and the challenges faced by HIPE coders in abstracting information in a timely and accurate manner and in line with coding guidelines.

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The Missing Link - Clinical Documentation

Kathleen Wilton [a]

Introduction
The value of casemix is dependent on the many factors that underpin it; codes, costing, funding - all datasets that have their own nuances, rules and determinants but the key to it all is the quality of the clinical documentation used to determine these datasets. Clinical documentation needs to be complete and accurate for the success of a quality casemix program. Codes cannot be assigned, and costs cannot be allocated if the patient story is not documented completely and accurately. So how do we determine the quality of the documentation in the clinical records in relation to casemix outcomes.

Methods
3M partnered with a leading tertiary hospital in Australia in a project to understand the quality of the clinical documentation in the context of maximizing casemix complexity. This project reviewed the clinical content of the medical record in relation to its completeness for clinical coding purposes.

Using a 3M methodology to determine a sample of 200 recent episodes of care. Both both overnight and multiday length of stay episodes were included. A manual review was undertaken by a team of coding experts to determine the accuracy of the assigned Diagnosis Related Group (DRG) for each episode. Where a DRG change was found an indicator as to the reason for the change was noted.

Results
The casemix index (CMI) of the sample prior to the review was determined and compared with the post review results.

The review determined a 2.3% Casemix Index increase was possible at 100% realization. To meet this goal it would require that 100% of episodes of care were reviewed in a 12 month period and that all the queries generated as a result of the review were agreed to by the Clinicians. As much as 3M have a conservative approach to queries requiring the support of Clinicians it is unlikely that all queries would be agreed to. This leaves us with a more realistic result of perhaps a 75% or even a 50% realization meaning a CMI increase of somewhere between 1.2% (50% realization) or 2.3% (100% realization). To meet this outcome it was determined that there be a minimal increase in CDI staff and that there be additional training for the CDI specialists and clinical teams responsible for the documentation.

Extensive training was undertaken for the CDI (Clinical Documentation Improvement) team and several Clinician training sessions were held. As this was during the COVID pandemic all training was held remotely.

Conclusions
Data was gathered for the following financial year detailing the financial implications of each of the DRG changes instigated by the CDI team. These results realized a CMI increase of 1.6% which represented a 69% realization rate from the original study.

The results of this project indicate that it is possible to predict a financial opportunity, based on a representative record review, that may be possible with an improved CDI program. An improvement in clinical documentation is not only a positive for financial outcomes and benchmarking but all datasets that feed into a casemix system which we rely on for the management of our healthcare systems.

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Data quality in different ICD10 systems: comparison of a block contract funded system and an activity based funded system

Rebecca Ziffer [a], Alex Kafetz [b], Sharon Roumanos [a]

Introduction
Different healthcare systems use different ICD coding systems including the Australian Modification (ICD-10-AM), ICD-10-CM in the USA and a Canadian Version (ICD-10-CA). These are implemented against the backdrop of different approaches in government to health policy, Canada uses block payments, whilst Australia uses an activity-based funding system (ABF). A study is taking place commissioned by the Pacific Health Services Authority (PHSA) in British Columbia to understand the differences in coding in their system compared to the Australian system especially different approaches to mandatory fields.

Methods
Over 900 indicators pertaining to the data quality of the ICD10 data have been developed for the specific use against the Australian modification. Approximately 200 of these have been adapted to be used on the ICD-10-CA modification to be tested across 14 hospitals in British Columbia. Specific attention is going to be paid to a subset of highly prevalent long-term conditions such as diabetes. The aim will be to identify different approaches to mandatory fields in these two systems - one which uses block contracting and one which uses activity-based funding. The approach to mandatory fields is likely to affect a number of secondary uses for the data including population health management, resource allocation and measurement of safety and quality.

Results
Results are not yet available but will be before the PCSI conference in 2024

Discussion
There are a number of similar challenges in the Canadian and Australian health systems not least the narrowing of inequalities with regards to First Nations, Metis, and Inuit peoples in Canada and Aboriginal and Torres Strait Islanders in Australia. On the face of it, the ICD coded data should be a perfect source to be able to do this and create best practice in quality and safety in healthcare. However, the differing approach to mandatory fields may be a severe impediment to be able to do this. This also means data submitted to global analytic bodies such as The Organisation for Economic Co-operation and Development (OECD) and the World Health Organization cannot be compared like-for-like due to these different approaches.

This study, which will be the first of its kind, will identify the differing policy guidelines and approaches to mandatory fields, using the lens of prevalent long term conditions and offer quantitative assessments of the differences and similarities of the two approaches and qualitative discussion points as to the advantages and disadvantages and each and suggest

learning and recommendations where consistency and common approaches to mandatory fields will make data more robust and of higher quality.

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Casemix funding/ activity based funding (1)

Return to Activity Based Funding in Ireland post COVID-19

Brian Donovan [a]

Introduction
When the COVID 19 pandemic reached Ireland in March of 2020, it had a significant impact on the healthcare system and created major challenges for in accounting for new and unknown patterns of healthcare usage and costs such that it was no longer possible to fund our hospitals using ABF.

Emergency measures included reverting to block funding for the financial years 2021-2023. However, during this period we continued to carry out the annual ABF process which proved useful in providing the information needed to monitor the impact and effects of the disease and make important decisions as to where resources should be deployed, notwithstanding that the output from the process was not suitable for funding purposes.

It was also essential that the building blocks for ABF were kept in place during these years to ensure that we were in a position to return to ABF when conditions allowed.

During this period , the Healthcare Pricing Office (HPO) published the second Implementation Plan for Activity Based Funding (ABF) in Ireland, as part of a programme of work to support the delivery of the Sláintecare Implementation Strategy.

This Plan represented an important step forward in increasing transparency in funding, encouraging efficiency, value for money and sustainability, and ultimately providing greater accountability for the way resources are allocated in the Irish healthcare system

This presentation will outline the main areas of the plan and the changes made to the ABF process in 2023.

Methods
COVID-19 has had a significant impact on the healthcare system and has created major challenges for in accounting for new and unknown patterns of healthcare usage and costs. Whilst emergency measures have included temporary increases to block funding, ABF and its building blocks have proved useful in providing the information needed to monitor the impact and effects of the disease and make important decisions as to where resources should be deployed, and will continue to be critical for health system insights and funding into the future.

The implementation plan contains 35 objectives covering areas including data quality, training, policies and governance across all data streams such as admitted care, ED care, outpatient care and community care. COVID-19 has demonstrated the significant capacity of the health system to respond effectively to the need for rapid change and improvement

Results
The 35 Actions within the Implementation plan have been largely completed to date and has included pilots to introduce the collection of patient level data for the non-admitted areas of Outpatients and Emergency Departments. Both patient areas are using the Australian Classification systems.

The ABF Benchmarking process has been re-established in 2023 based on 2022 admitted expenditure and activity. This has resulted in adjustments to acute hospital budgets for 2024. Costing guidance

was provided to account for the COVID cases that were still present in the Irish Hospital system in 2022.

Changes to the Funding model in 2023 included updating from V8 to V10 of the Australian DRG Classification System, creating groups of hospital that were similar from a cost perspective and creating an admitted care weighted unit to cover both inpatient and daycases. The admiited care weighted unit allows us to compare complexity of Inpatient and Daycase Activity for the first time.

Conclusions
The Government's Sláintecare Implementation Strategy made clear the need to strengthen the implementation and expansion of ABF across the Irish healthcare system. This was to be done through the reduction in the level of transition adjustment, the inclusion of more hospitals in ABF and the expansion of ABF to the Outpatient and ED areas

After the suspension of ABF during the COVID pandemic it was important that the return to ABF happen as soon as possible to maintain the provision of data from the process. The information that is provided by the annual ABF process has uses well beyond funding particularly now as we move into the post COVID period where we have seen changes to the cost base and occupancy levels.

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Developing a national mental health care classification for activity based funding

Laura Harris [a], Dominic Tate [a], Rosie Ohlsson [a], Georgina Young [a]

Introduction
The Independent Health and Aged Care Pricing Authority (IHACPA) is responsible for developing and reviewing Australian casemix classifications which aims to facilitate a nationally consistent, evidence-based and transparent method of classifying patients, their care and associated costs in order to provide better management and funding of high quality and efficient health care services.

Nationally adopted classification systems enable clinical information to be converted into clinically meaningful, manageable data categories, and utilised by Australian governments to support activity based funding (ABF) of Australian public hospitals. In 2012, IHACPA commenced development of the Australian Mental Health Care Classification (AMHCC) to provide a more clinically relevant classification; a better explanation of resource consumption (cost) at the consumer level; and integrated service delivery by spanning all service settings.

Methods
Prior to the implementation of the AMHCC, there was no single classification used for mental health services. The Australian Refined Diagnosis Related Groups (AR-DRGs) classification was used for admitted mental health to group the number and type of consumers treated in acute episodes to the resources required in treatment, while there was no classification for community mental health.

IHACPA consulted extensively with specialist clinicians, working groups and mental health representatives to develop the AMHCC, which introduces consumer characteristics and incorporates clinical measures into national activity data reporting using six variables: setting, mental health phase of care, age group, mental health legal status, Health of the Nation Outcome Scale and Life Skills Profile.

Results
IHACPA first modelled prices using the AMHCC for the 2020-21 financial year. In 2022-23, following a transitional period, the prices modelled under the AMHCC informed the funding of mental health care services in the admitted setting for the first time. Analysis indicated that admitted mental health activity is more costly than acute care activity grouped to the same AR-DRG end class. It also showed that the AMHCC model resulted in an improvement in cost prediction and higher modelled cost than the AR-DRG model for specialist mental health care services.

For the community setting, pricing using the AMHCC is proposed to inform funding in the upcoming 2024-25 financial year. Previously, funding for the community setting was provided on a block funding basis rather than ABF, resulting in a lack of transparency in the funding of these services. The AMHCC provides better recognition of complexity and cost intensity based on consumer characteristics compared to the current block funding arrangements for community mental health care.

Discussion
The introduction of the AMHCC has provided a national, clinically meaningful classification and prediction of cost, and resource for mental health care services. It has improved the accuracy and consistency of data reporting on services provided across different mental health care settings and enabled the pricing of mental health services for use in ABF.

The implementation of the AMHCC - a consumer centric classification - represents a step toward value-based care and funding models that aim to increase integration and coordination of care between admitted and community care settings and providers.

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The journey to activity-based funding for community mental health care delivered by Australian public hospitals

Julia Conway [a]

Introduction
Community mental health care delivered by Australian public hospitals is currently block-funded due to the previous absence of an appropriate casemix classification to enable activity-based funding (ABF). Since 2012, the Independent Health and Aged Care Pricing Authority (IHACPA) has undertaken extensive work to develop the Australian Mental Health Care Classification (AMHCC) Version 1.0, which was released in 2016. Following the development of an appropriate pricing model, the AMHCC V1.0 will be used to enable the implementation of ABF for these services, thereby achieving the objectives of Australia's National Health Reform Agreement.

Methods
To support state and territory health systems to prepare for the implementation of ABF, IHACPA has undertaken three years of shadow pricing to facilitate impact analysis and management of transition risks. This has involved consideration of alternative pricing model structures, particularly in terms of the incentives such models create and their associated policy implications. Related analysis has investigated variations in service delivery structures across Australia, economies of scale in an ABF environment and how to account appropriately for private patients. The overarching objective of model refinement has been to ensure the pricing and funding model appropriately accounts for existing service delivery patterns and supports quality, integrated and consumer-centred care delivery,

without creating undue incentives or requirements to change care delivery in response to the introduction of ABF.

To support readiness, IHACPA also published educational materials to support clinical and hospital manager understanding of the classification and consulted extensively with a range of jurisdictional, clinical and other stakeholders to identify and address relevant issues. A key challenge in the transition has been understanding the projected funding impact due to the limited transparency of existing block-funding arrangements.

Results
Work to facilitate the transition to ABF has highlighted complex policy, data collection, pricing and funding issues that have been addressed over time through close engagement with health system managers and ongoing refinements to pricing arrangements to prepare for ABF implementation. Planned progression to ABF for community mental health care services delivered by Australian public hospitals will improve the transparency of over $3.5 billion in funding and enable future pricing and funding to more closely align to the complexity, type and intensity of mental health care needs of individual consumers, as well as changes in the cost of service delivery over time. As ABF implementation matures, this will support longer-term refinements to further incentivise value-based, integrated and consumer-centred care.

Discussion
This will be the largest public hospital funding category to transition from block-funding to ABF since the introduction of national ABF in Australia. It has required a complex, multi-year work program. This has highlighted a range of important considerations for health systems seeking to implement ABF or other funding models informed by casemix classifications, both in terms of policy issues arising in the funding transition, as well as the value that clinically-relevant and appropriate casemix classifications can offer in improving the transparency and value-basis of all funding arrangements.

[a] Independent Health and Aged Care Pricing Authority, Australia

Funding Hospitals in a moving environment: international perspective

Jean Marie Rodrigues [a], Béatrice Trombert [b]

Since 40 years the hospitals funding has changed from a supply to a demand based process due to the use of DRG or Casemix in most countries of the world. This standardized way to measure and compare resource needs for hospital patient population has pinned up the way in some countries to a health care funding based on the whole population resources needs in an integrated care system.

This standardized way of measure is dependent of clinical coding which on one hand is facilitated for diagnosis by the availability of the WHO International Classification of Diseases and Health Problems 10th revision with national adaptations but on the other hand hampered by the Babel tower development of national procedures by different countries when some other countries have decided to use the procedures coding systems supporting the 2 world most used DRG systems: the United States ICD10 CM/PCS and the Australian ICD10 AM/ACHI.

For the future WHO has decided to approve the NordDRG grouper supported by the Nordic Classification of Surgical Procedure (NCSP) and ICD10 as a comparative tool but supported by ICHI

and ICD11.

We present the updated international view of the situation and the case of countries using a DRG Casemix system initially developed with a procedure coding system with another procedure coding system.

We discuss the consequences of the procedures coding system choice for the use of the Casemix system: Resource Allocation, Reimbursement, Performance comparison, effectiveness and efficiency of health care policies.

Finally we propose to extend the Casemix methodology to manage the health integrated care

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Sector-Equal Remuneration through Hybrid DRGs - Classification and Calculation Model

Christian Jacobs [a], Frank Heimig [a], Isabel Huber [a]

Introduction
The German legislator has implemented a new form of remuneration for hospital services called "Hybrid DRGs", starting in 2024. Traditionally, a large variety of medical interventions has been provided on both an outpatient and inpatient basis in Germany ("double specialist track"), but with different remuneration for these services, possibly incentivising an expansion of inpatient services. Hybrid DRGs shall eliminate this incentive by providing equal remunerations for comparable medical services.

Methods
The starting point for 2024 was a catalogue of 34 procedure codes, provided by the Federal Ministry of Health (MoH), from five performance complexes:

- certain hernia operations
- removal of ureter stones
- ovariectomies
- arthrodesis (fusion) of the toe joints
- excision of a pilonidal sinus

The only other terms that were defined for Hybrid DRGs were a length of stay of one day and a PCCL < 3.

Providing a uniform remuneration for Hybrid DRGs requires an operational service definition as well as a suitable calculation model.

Defining the future content of Hybrid DRGs should answer the question which patients should be assigned to the respective Hybrid DRGs and which patients shouldn't. On one hand, possibilities to "escape" the Hybrid DRGs by coding should be minimized- resulting in

the broadening of the DRG definitions (e.g. by also including unspecific procedure codes). On the other hand, patients that undergo additional and more complex surgery may not be eligible for Hybrid DRG remuneration- requiring a narrowing of the DRG definitions.

With regard to the revenue calculation, the G-DRG principle that revenue values should be derived from data, did not change for Hybrid DRGs but had to be modified. Case-related cost data from inpatients and remuneration figures (according to a fee-for-service catalogue as cost-based data is not available here) from outpatients as well as the inpatient/outpatient ratio were taken into account. For outpatients, InEK had to use data sources from outside its own data collection; this data was provided by the Institute for the Evaluation Committee and the MoH.

Results

To define the exact content of the Hybrid DRGs was a challenge as the "starting catalogue" did not yet provide a workable definition. Analyses showed that most cases with these codes also had other relevant procedures that could either render the case unsuitable for Hybrid DRG remuneration or show no significant differences that would advise against including these additional procedures in the DRG. Decisions were typically informed by InEK's extensive inpatient data bases that provide relevant information (cost, LOS, comorbidity, clinical profiles) on a huge variety of case constellations.

Overall, twelve Hybrid DRGs for the five areas could be established. Within each area, the calculation model ensured severity-adjusted remuneration, as required by the legislator's mandate. As a result, around 180,000 cases of the annual total of around 16 million inpatient cases will be remunerated via Hybrid DRGs in 2024. The legislator plans to include a variety of other medical procedures into the Hybrid DRG system in the future with an expected 1 million cases in the year 2025 already.

Discussion

The future uniform remuneration for Hybrid DRGs will typically be lower than the previous inpatient remuneration, but typically higher than the different models of outpatient remuneration that were previously applicable to hospitals. This can create an incentive for hospitals to increasingly provide outpatient services for patients that have been treated as inpatients in the past, especially when health insurers also focus on cases potentially eligible for Hybrid DRG remuneration. The introduction of Hybrid DRGs requires a close cooperation between the responsible parties. With the expected practical application from 2024 on, it will become clear to what extent the degree of outpatient treatment can be increased. The Hybrid DRGs mark a first step towards sector-equal remuneration in Germany.

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Wednesday Afternoon

Nordic (2) Classifications and coding quality (Nordcase)

DRG for rehabilitation in Sweden - joint use of three health-related classifications

Ann-Helene Almborg [a], Ralph Dahlgren [a]

Introduction
As a Nordic collaboration a grouping logic for rehabilitation was added in 2008 to Nord Diagnosis Related Groups (DRG) at the request of the health organizations. It contained of 33 new DRG groups based on the Nordic Assessment Score manual (NASS manual). The DRG for rehabilitation was using ICD-codes and codes for functioning.

Development in Sweden resulted in increased number of codes for functioning, but the ICF-codes were not used. The DRG system also included some interventions in the Swedish Classification of Health Interventions (KVÅ). This version of the DRG-system was implemented 2011. However, the original grouping characteristics in NordDRG remained. DRG 2021 consisted of 11 grouping properties used for 33 DRG.

Further development 2023 aimed to:

- replace the existing functioning-codes with ICF-codes
- enable the use of additional ICF-codes to describe more areas of functioning
- enable the use of additional rehabilitation interventions from KVÅ
- develop Rehab DRGs for mental health conditions.

Methods
The further development has been performed by review of ICF-codes from following sources:

- existing 18 modified functioning-codes in Nord DRG for rehabilitation (maps to ICF)
- functioning entities in ICD-11 V Chapter Supplementary section for functioning assessment (maps to ICF)
- WHODAS 2.0 (maps to ICF)
- ICF core sets for Rehabilitation
- frequently used ICF-codes in the ICF-core sets (n=40)

The original grouping properties for functioning were used to identify relevant ICF-codes from the sources used in the review. Relevant rehabilitation interventions from KVÅ was identified. ICD-codes for mental health conditions were already identified in NordDRG, but not used for rehabilitation.

Results
ICD-codes are used as main diagnosis. The analyze of the 12 grouping properties for functioning resulted in 90 ICF-codes of which 40 ICF-codes are used for nine new grouping properties for functioning. The remaining 50 ICF-codes are used for another new grouping property. The ICF-codes are used with the qualifiers. The new 10 grouping properties for functioning based on ICF-codes are used for the ten new DRG groups.

Totally are 255 KVÅ-codes for rehabilitation interventions used, The DRG-system for year 2025

consists of 85 DRG for rehabilitation for the 12 groups of health conditions.

Discussion
The updated DRG for rehabilitation will support the joint use of ICF, ICD and KVÅ (interventions). This DRG-system will improve the possibilities to:

- describe the functioning level as complement to the health condition and performed rehabilitation interventions
- joint use of ICF, ICD-10-SE and KVÅ (interventions)
- collect data - to be used at local, regional or national level
- further develop DRG for rehabilitation in other areas such as primary care.
- follow the patient's functioning level and rehabilitation pathway in health care.

ICD-11 and ICHI will have the same potential use as well.

[a] National Board of Health and Welfare, Sweden

Coding differences in medical records in the early stages of DRG implementation and now

Kristīne Putniņa [a]

Abstract not available

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Quality of Clinical coding

Emma Kajander [a]

Abstract not available

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Analysis of casemix data (2)

Estimating direct diabetes-related healthcare expenditures in Slovenia to improve diabetes care in inform future resource allocation decisions

Petra Došenović Bonča [a], Dalibor Gavrić [b], Karmen Janša [c], Jože Sambt [a]

Introduction
The burden of diabetes on individuals, healthcare systems, and society must be explored to improve diabetes care and prevent costly complications, to assess future healthcare needs and to continue assuring sufficient resources for patient care in view of rapid demographic change.

Methods
Analysis of expenditures during the 2019-2022 period was based on individual patient data on expenditures for seven groups of diabetes-related medical conditions coded based on ICD from the population-level database of the Health Insurance Institute of Slovenia. The structure of expenditures was also observed by gender, age and type of healthcare services and products. The projections of future direct diabetes-related healthcare expenditures were based on the age and gender profiles (i.e., per capita averages) of the expenditures for each group of medical conditions. Expenditure projections were prepared using the European Commission's methodology for budgetary projections. The baseline scenario (the Ageing Working Group reference scenario) used for EU fiscal surveillance was followed. In this scenario, healthcare expenditures are driven by the assumption that half of the future gains in life expectancy are spent in good health, and income elasticity of healthcare spending is converging linearly from 1.1 in 2019 to unity by the end of the projection period. By using this methodology, the projections of direct diabetes-related healthcare expenditures up to 2050 were prepared using 2019 data to avoid the impact of the epidemic and to assure comparability of estimated diabetes-related expenditures with projected growth of overall healthcare expenditures.

Results
In the 2019-2022 period, average annual diabetes-related expenditures equalled €174.1 million (€1,108 per patient), with their average annual growth rate reaching 12.5%. These expenditures represented, on average, 4.8% of the total national healthcare expenditures funded through compulsory and complementary voluntary health insurance that covered co-payments during the observed period. Expenditures due to inpatient care (33%) and drugs used in diabetes (24%) had the highest shares. More than half of the expenditures were due to complications of diabetes. The diabetes-related expenditures as a share of GDP are projected to increase by 19.2% from 2019 to 2030, with slower yet continued growth up to 2050.

Discussion
Diabetes-related expenditures in Slovenia continue to rise. By focusing on the prevention and optimal management of diabetes, its impact on the healthcare system could be reduced significantly, given the magnitude of expenditures attributed to complications. While notable cost savings could be generated by optimizing diabetes care, demographic changes will fuel future diabetes-related expenditure growth indicating the need to carefully plan future needs of diabetic patients and assure adequate health care resources for their care.

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Re-introducing ABF in Ireland - understanding hospital performance

Mark O'Connor [a]

Introduction
After a pause caused by COVID Ireland has re-introduced Activity Based Funding (ABF) in 2024, based on 2022 costs and activity. This presentation will illustrate how this has progressed and the information shared among hospitals to support understanding of hospital performance.

Methods
Begin with information about the structure and environment for the re-introduction of ABF including the different structures nationally, how they are changing, and the broader financial and human resource environment.

Detail

- How ABF works in Ireland
- Significant changes in the structure of the ABF model
- Anonymised results by hospital and group
- Drivers behind ABF performance
- Problems encountered
- Hospital level reports and the information contained
    - Different elements of ABF Revenue
    - Admitted activity profile for each patient type
        - Overnight inpatients
        - Non elective same day cases
        - Elective same day cases

      All of these items shown by

        - Cases
        - Admitted Patient Weighted Units (APWU)
        - Casemix Index (Complexity/Costliness)
- Beds
    - ABF Cost per bed
    - APWUs per bed
- Costs
    - Medical pay cost bucket versus peers
    - Nursing pay cost bucket versus peers
- Average length of stay versus peers by DRG - This is a new piece of analysis showing differences in LOS adjusted for complexity
- Discharges by day of the week and if discharges reduce at weekends
- Coding Complexity or ABCDZ Analysis - This is a new piece of analysis that examines the relative complexity within each Adjacent DRG across peer hospitals to find evidence of hospitals not fully capturing complexity.

Results
I will present the findings of this analysis and how ABF and the supporting information has been received by hospitals. This is a current Work in Progress given the evolving circumstances.

Conclusions
I will reflect on what has worked and what needs to be improved and how they information above has been received and the impact that it has made.

[a] Healthcare Pricing Office, HSE, Ireland, Ireland

Analysing Length of stay variation in metropolitan Adelaide public acute hospitals

Stephen Duckett [a], Nick Cugley [b]

Introduction
The South Australian Health Performance Council is an independent government body charged with reviewing the overall quality, efficiency, and access of the South Australian (SA) health system. This presentation reports on the findings of a recent review conducted by the Council.

Background to the Issue
One finding of its statutorily required four-yearly review of the SA health system was that SA public hospitals were on average less efficient than other Australian public hospitals, and that there was efficiency variation within SA, with the state's largest hospital, the Royal Adelaide Hospital (RAH), being less efficient than other hospitals in Adelaide. The Council therefore initiated a specific review to understand causes of this variation.

Methods
Because of some controversies over use of cost data at the RAH, comparisons of average length of stay (LOS) were undertaken. Separation data on all discharges from Adelaide public hospitals in 2021-22 were analysed, standardised for Diagnosis Related Group. The analysis focused mainly on LOS for overnight patients. Details of the methods are in the publicly released report: https://tinyurl.com/42tuwumy

Results
The review report revealed a small difference in LOS between the RAH and the metropolitan Adelaide average LOS, but this added up to a waste of 40 beds every day because of the size of the hospital. The review report analysed causes of this variation partly to address potential criticisms of the approach ('we treat more rural patients', 'you haven't standardised adequately for our casemix'), and partly to provide pointers to where the hospital might look to achieve improvements in efficiency.

Conclusions
The presentation will describe the process followed by the Council in producing the review report and the response to the report to date.

[a] Chair, South Australian Health Performance Council, Australia
[b] South Australian Health Performance Council, Australia

Testing the French casemix system on a Belgian hospital discharge dataset: feasibility and challenges

Andre Orban [a]

Introduction
Activity based funding (ABF) was introduced in Belgium more than 20 years ago, using the APR-DRG-system based on ICD-10-CM and ICD-10-PCS (earlier ICD-9-CM). ABF represents only 20% of the total hospital budget for inpatient and one day activity. Other funding sources are calculated in a very different, complicated way. Moreover, the physicians act as independents and are remunerated by means of fee-for-service, ceding a substantial percentage of their income for the hospital's functioning.

As hospital financing in Belgium has become a labyrinth, political will exists to reform the system into an " all-in " payment system based on casemix. Different workgroups started to examine this transition.

Methods
The purpose of our workgroup was to test an existing hospital financing system of a neighbouring country on a Belgian dataset. In this paper, we focus on the feasibility and challenges of code mapping.

We obtained the standardized hospital discharge dataset of 8 Belgian hospitals from 2019, representing 250,000 hospital stays and one day contacts, without any possibility to review the original patient record.

As France is assumed to have a similar demography and morbidity as Belgium and a very similar coding logic, we focussed on their system. However, the coding language in France is CIM-10-FR for diagnosis and CCAM, a propriate French system, for procedures.

The most accurate way to test CIM-10-FR and CCAM would be to re-code the Belgian patient records by a French coding team applying all their rules and conventions. Re-coding 250,000 stays however wasn't realistic.

Therefore, we decided to establish a translation dictionary between CIM-10-FR and ICD-10-CM on the one hand, and between CCAM and ICD-10-PCS on the other. Once this mapping was developed, we could group the stays into the French grouper and analyse different aspects related to French DRG's (called " GHM ").

Results
15,800 diagnosis codes and 5,200 procedure codes were mapped into the French coding language.

Although CIM-10-FR and ICD-10-CM are both derived from WHO's ICD-10, differences are huge:

- the precision of a coding concept varies mostly between both systems;
- the same alphanumeric code can have a different content;
- coding instructions differ.

Differences between CCAM and ICD-10-PCS are even bigger as both systems use a totally different semantic logic.

Our method has some limitations that potentially introduce a bias that only could be addressed via chart review, such as:

- some medical concepts require more precision in the target system;
- different conventions in e.g. assigning the principal diagnosis;
- much more unspecified codes are rejected as principal diagnosis by the French grouper (which could explain less of unspecified DRG's in France).

Conclusions
A mapping exercise between two similar coding systems reveals some unexpected observations:

- greater differences between ICD-10-CM and CIM-10-FR than expected;
- different code granularity per chapter in both systems;
- differences in principal diagnose code assignment;
- a huge difference in procedure coding logic and assignment method.

Several aspects need more exploration. But looking forward to ICD-11, a first lesson learned is to avoid country specific coding systems with different granularity to enhance international comparisons and supranational interoperability.

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Casemix, quality and outcomes (1)

Improving regional comparative analysis of quality and efficiency using a needs-based population classification system (PopGrouper)

Wilm Quentin [a], Karen Kinder [a], Ulrike Nimptsch [a], Chrissa Tsatsaronis [a], Anika Kreutzberg [a], Reinhard Busse [a]

Introduction
As found in other countries, there are regional variation in care provision in the German healthcare system, which can also be traced back to overuse, underuse as well as misuse of healthcare services. To identify unwarranted variations and to improve quality and efficiency, it is crucial to understand the regional distribution of care patterns. However, regional analyses face the challenge of ensuring comparability of regions with regards to their morbidity burden to attribute observed regional variation to differences in quality and efficiency.

The PopGrouper is a needs-based population classification system which classifies persons into mutually exclusive groups with similar care needs (medically and economically homogenous) enabling such regional comparisons. This work aims to show the extent to which the PopGrouper can contribute to adjusting for morbidity-based care needs in regional comparative analyses to draw better conclusions about regional differences in quality and efficiency.

Methods
Five exemplary indications that represented different patient groups with high, medium, or low levels of complexity were selected. Intraclass coefficients were calculated based on multi-level models to show what proportion of the observed regional variation can be explained at the level of the PopGroup, the patient, the hospital, and the region (district). The analyses are based on German sickness-fund data from 2019. For each selected indication, efficiency-related outcomes (e.g., inpatient length of stay) and quality-related outcomes (e.g., 30-day mortality or stroke unit treatment) are analyzed. Finally, results from the best- and worst-performing regions in terms of their healthcare provision patterns are compared.

Results
At the time of abstract submission, results are available for the regional comparative analysis of patients with stroke. At the time of presentation, results of at least four other indications will be available. The preliminary results show that a significant part of the variation (over 25%) can be explained by the PopGroup assignment. Adding the PopGroup variables to common patient-level predictors increases the explained variation by over 10 percentage points. Only a small proportion can be explained by regional characteristics, in particular regional deprivation.

Discussion
Initial results indicate that the PopGrouper can make a significant contribution to mapping morbidity-related care needs in regional comparative analyses and thus better draw conclusions about unwarranted variations in care quality and efficiency.

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Outcomes Measurement & Evaluation in Population Health using the ACG System

Stephen Sutch [a], James Barrett [b], Paul Molyneux [b]

Introduction
Risk adjustment applied to outcomes measurement can help to ensure that reasonable account are made of health factors that can effect outcomes that are not directly related to the intervention, programme or policy being reviewed. Common measurement approaches such as Case-mix adjustment, Stratified Sampling, Segmentation and Stratification can be used in Population Health.

This study utilises a Propensity score matching (PSM) method, as a quasi-experimental method which mimics randomization and creates matched-pair controls.

Outcomes do not directly assess quality of performance. They only permit an inference about the quality of the process. The degree of confidence in that inference depends on the strength of the predetermined causal relationship between process and outcome.

Data Needs - Because the relationship between process and outcomes is a probability, it is necessary to collect an appropriately large number of cases before one can infer if care is better or worse or meets specified standards. Outcome measurement requires specification of the appropriate time window which is the time when outcome differences caused by degrees of quality in health care are most manifest.

Data considerations include the need for comprehensive data, both with respect to the population of interest, but also across different health and social care providers.

Other data considerations: Availability, Completeness, Accuracy, Susceptibility to manipulation, Information about delayed outcomes, Data collection timeline.

Methods
Principally we want to know the participants' outcome with and without treatment controlling for all other effects. We know that participants differ from non-participants, so the objective is to find a large group of individuals who match the participants in all relevant pre-treatment characteristics. This then allows any difference (if well selected) to be attributed to the intervention. With multiple characteristics to control for a propensity score approach can be used. Such a score is based on the probability of participation in the program given the pretreatment characteristics.

PSM consists of: 1. score each patient using data prior to enrolment; then 2. pairing treatment and control individuals based on the same or nearest score; 3. follow-up and measure outcomes e.g. 6-month, 12 month, 24 month and compare results.

Results
Further selected results will be provided.

	All Data (n=2365)				PSM - Near Neighbor (n=1846)				PSM - Caliper (n=1730)			
Plan A	(n=1442)	(n=923)			(n=923)	(n=923)			(n=865)	(n=865)		
	Not-Enrolled	Enrolled	Diff	P value*	Not-Enrolled	Enrolled	Diff	P value*	Not-Enrolled	Enrolled	Diff	P value*
Total Cost $	23,315	20,003	**3,312**	0.085	24,490	20,003	**4,487**	0.043	24,449	20,262	**4,187**	0.074
Inpatient hospitalizations	0.3454	0.3315	0.01	0.707	0.3499	0.3315	0.02	0.654	0.3387	0.3329	0.01	0.892
Emergency Visits	0.5902	0.5959	-0.01	0.924	0.6652	0.5959	0.07	0.322	0.6763	0.5977	0.08	0.287

Discussion and Recommendations

- Establish measures and data collection from the outset, not retrospectively.
- Decide on randomised study, or casemix adjusted population cohorts.
- Is there an obvious comparison population (Intervention v Control)
- Matched pairs create a population similar to those in managed care ("Intervention group")
- Creation of a risk score or probability, assigned pre-enrolment.
- Consider the time frame (time window), is it absolute (same months), or did individuals/groups join at different times.
- Follow up measurement at specific time periods.
- Compare outcome measures of different groups.
- Create strata of sub-groups to better understand impact.

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Secondary use of administrative data to compare healthcare provider quality

Dalibor Gavrić [a], Karmen Janša [a]

Introduction
Administrative healthcare data is increasingly being utilized for research and management within the healthcare system. This data can also serve as a tool to compare the quality of different healthcare providers. The Health Insurance Institute of Slovenia (hereinafter: HIIS) has used this healthcare data to develop quality indicators for health services.

Methods
Since 2013, the administrative database at HIIS has been structured at the individual person's level and organized within a data warehouse. It includes demographic information, data on medical treatments, the principal diagnosis, secondary diagnoses of coexisting health conditions, codes for procedures, medications, medical devices, and rehabilitation. These data HIIS collects from healthcare providers for billing purpose.

The primary objective of our analysis is to use this data to prepare quality indicators for various medical treatments and to supply healthcare providers with a comparative analysis. The secondary objective is to present these indicators to insured persons, thereby facilitating their decision-making process when choosing a healthcare provider.

Results
Quality indicators have been prepared for orthopaedic surgery (planned hip and knee endoprosthesis) and gastro-surgery (planned and acute gallbladder surgery and planned operations of inguinal hernias). For all areas, we have presented the average length of stay, complications, unplanned readmission rate, and mortality rate. Quality indicators are shown for Slovenia as a whole and by individual healthcare providers from 2015 onwards.

Discussion
Using administrative data to compare the quality of providers has its pros and cons. Some advantages include comprehensive coverage of the entire population in Slovenia (HIIS is only provider of obligatory health insurance), long-term data availability, and no additional burden on healthcare workers for data collection. However, potential disadvantages include the possibility of errors in coding diagnoses and procedures, and a lack of information about comorbidity and chronic diseases.

Conclusions
The administrative health database is a valuable resource of data for comparing the quality of different providers. It provides useful information for providers to improve their quality of service and assists patients in choosing the most suitable provider. Future objectives include developing quality indicators for all medical specialties and include them into the payment model.

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Casemix funding/ activity based funding (2)

Innovation in an Activity Based Funding Environment

Normand Lantagne [a], Pierre Leveille [b]

Introduction
Quebec is the largest province in Canada by area (1.668million km2), and the second largest province by population (8.5 million). The Quebec government is responsible for funding health care and social services and has recently announced an increase in activity based funding (ABF) to $12 billion in the next 5 years[1].

In the 1980's robotic assisted telemanipulation was introduced in surgery. In the 2000s, Intuitive Surgical introduced the "Da Vinci" robot, providing surgeons with a short learning curve and better ergonomics. Patient demand increased the use of a robotic assistance, such that in the US, prostatectomies with robotic assistance went from 1% in 2004 to 90% in 2014.

Methods
Six health service organizations collaborated to study they impacts of robotics on three surgical procedures: hysterectomies, prostatectomies and nephrectomies.

The Canadian Classification of Interventions (CCI) defines codes for surgical interventions, including a unique code for robotic assisted telemanipulation of tools.

This analysis evaluated the cost for the three surgeries by approach and with the use of robotics in Quebec, supplemented with data from other provinces with case costing data submitted to the Canadian Patient Cost Database. The data used was from 2019-20 to avoid the influence of the COVID-19 pandemic.

Clinical advantages of using robotic assisted telemanipulation were studied by the Unit for the Unité d'évaluation des technologies et des modes d'intervention en santé et en services sociaux (UETMISSS)[2] at the Centre hospitalier universitaire de Sherbrooke.

Results
The average direct cost of the original episode of hospital care for robotic assisted telemanipulation surgeries was almost twice as much as any of the other approaches (open, endoscopic, vaginal). The highest cost during this stay was related to the non-reusable operating room supplies.

This was consistent with the data from other provinces held in the Canadian Patient Cost Database.

Discussion
ABF is usually based on the average cost of single stay for cases in a patient group (APR-DRG) rather than individual cases, which may include multiple surgical approaches. In addition to the clinical advantages, innovations such as robotic assisted telemanipulation surgeries can have overall financial efficiencies with shorter lengths of stay and lower readmission rates. Given the clinical and financial advantages of using innovative approaches, ABF should consider including approaches to fairly fund new and innovative approaches.

Innovation is critical to improving health care. ABF mechanisms should support innovation, and include mechanisms to fairly compensate new, and sometimes more expensive approaches. Without fair compensation for innovative approaches, hospital may be reluctant or slow to introduce such

approaches. This could be detrimental to patient care if the approach has been shown to be beneficial.

[1] https://ici.radio-canada.ca/nouvelle/1984039/dube-competition-financement-hopitaux-chirurgies
[2] https://www.santeestrie.qc.ca/en/professionnels/ressources-pour-les-professionnels/uetmisss

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Hospital Reform: A New Hospital Planning and Financing System with Hospital Service Groups

Isabel Huber [a], Christian Jacobs [a], Frank Heimig [a]

Introduction
The German hospital system is based on a dual financing model. Ongoing operating costs are primarily covered through Diagnosis-Related Groups (DRGs), while within the German federal system, the 16 states ("Bundesländer") are responsible for investment costs.

Hospital planning is a matter of state jurisdiction, with each of the federal states having its own hospital laws and hospital plans outlining overall guidelines and planning responsibilities.

The upcoming hospital reform aims to address both, the financing and planning of hospitals within the states. The reform centers around four key objectives:

1. De-economization
2. Securing and improving treatment quality
3. De-bureaucratization
4. Transparency

Essential to the new hospital planning system are the hospital service groups (HSGs, "Leistungsgruppen"), which categorise hospital areas based on the types of care they provide. HSGs should ensure that not every hospital can provide every service and the hospitals, which perform the services, have a high quality standard with better outcomes.

Methods
In Switzerland, HSGs have been used in the cantons for planning purposes for years. North Rhine-Westphalia (NRW), the German federal state with the largest population and almost 400 hospitals, has incorporated 65 HSGs into its current hospital plan. These HSGs are defined by the medical departments involved in patient treatment, case-related data (such as procedures, diagnoses, and age) and have a hierarchical structure.

The draft legislation for the Hospital Transparency Act proposes establishing a transparency register for hospitals, providing information on medical personnel, nursing staff, and the assignment of HSGs to all German hospitals. 65 designated HSGs are to be established on the basis of the work of the NRW hospital plan. The "Institut für das Entgeltsystem im Krankenhaus" (InEK, the German DRG institute) was commissioned to categorise hospital cases according to both DRGs and HSGs. The software developed for the ongoing development of the DRG system (DRG management tool) is currently being modified for purposes of future HSG management.

Results
After mapping the NRW HSGs in the "DRG management tool", resulting in a first HSG grouper, the definitions provided by the NRW hospital plan were evaluated, adapted to be applicable nationwide, and further specified where necessary. The software was then employed to simulate the impact on case classification when HSG definitions are modified. For instance, the definition of the urology service group in NRW, originally based on the medical department that discharged the patient, has been updated to utilise urology-specific procedure codes to improve accuracy of HSG assignment. Several medical societies have provided input for HSG definitions as well.

Discussion
The successful implementation of HSGs hinges on their clear and comprehensive definition. However, it is equally important to consider the purpose of these groups. Beyond defining the criteria for case assignment to HSGs, quality criteria should also be incorporated, so hospitals may need quality criteria like minimum staffing requirements or caseload thresholds to qualify for a specific HSG.

According to the current hospital reform plans, the current hospital budget is to be divided into a contingency budget (dependent on HSG and case severity) and a case-related budget. The precise details regarding the linkage of performance groups to a contingency budget are still under discussion among policymakers.

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Comparative Analysis of Casemix-based Efficiency Measures and Use among three countries: South Korea, France and US.

Euasin Joung [a], Rodrigues Jean Marie [b], Gilwon Kang [c], Insoo Chung [d]

Introduction
Improving the allocation of healthcare resources and the efficiency of hospital management is one of the common policy goals of countries implementing Casemix based Funding Systems. Differences in each country's healthcare environment including the relationship among stakeholders and the problem of the existing reimbursement systems can be factors that influence efficiency changes at both the macro and micro levels. Casemix based Funding Systems are intended to increase efficiencies in the allocation and utilization of healthcare resources. This ultimately leads hand in hand with the issue of determining payment levels differences between institutions based on the types of cases they treat. We compare how countries with different healthcare backgrounds deal with efficiency issues that are closely linked to actual hospital reimbursement levels and draw country-specific policy implications. The study is based on two focused comparative research questions

1. Has efficiency improved since Casemix based Funding Systems was introduced?
2. How was efficiency defined in the evaluation? And, how did you define the Inputs and Outputs for that definition?

Methods
we conduct our research in two ways. The first is a comparative analysis of changes and trends in efficiency before and after the introduction of Casemix based Funding Systems, based on reports and

data on countries' measurement and evaluation in practical areas such as pricing and payment within DRG systems and hospital level management. The second part of the study examines how countries have defined efficiency targets in their Casemix based Funding Systems, including the definition of inputs and outputs.

Results
The results of the primary and secondary content analysis are as follows The purpose of introducing payment schemes and the definition of efficiency in each country that have introduced Casemix based Funding Systems, have been subject to hasty generalizations during the introduction of the system and are restricted to increase the efficiency of hospital resource utilisation and budget allocation or to a hospital technical efficiency . The definition and measurement of the health care system economic or allocative efficiency based on a comparative study of efficiency and its actual measurement across countries, taking into account the healthcare environment (existing payment and reimbursement systems, public-private ratio, hospital vs ambulatory care, people socio economic factors et.), will provide key insights and policy evidence for the development of payment methods in the future.

Discussion
The discussion of efficiencies under the Casemix Funding system is closely related to reimbursement, payment compensation, and performance evaluation of the whole healthcare systems. It is hoped that this will be revisited through comparative research across countries.

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Classes and scores: How will casemix funding evolve?

Jim Pearse [a], Patrick McElduff [a], Susan Mitchell [a], Rex Parsons [a]

Introduction
Casemix classification have been used for payment purposes for over five decades (Fetter et al., 1980; Hornbrook, 1982). Under the approach, each unit of interest, such as an acute episode of care, is assigned to a class within a classification system. Diagnosis Related Groups (DRGs) are the most commonly used system. Payment for the service provider, such as a hospital, is then principally determined by the DRG, whether through a cost weight that is applied to a base price, or through a DRG payment rate. Most payment systems include additional adjusters for episodes to reflect other factors not accounted for by the DRG. Common amongst these are factors indicating the "outlier" nature of the episode and aspects of the care provided, such as treatment in an intensive care unit. The additional payment adjustments applied can be extensive. However, these payments systems are based on the perspective that all episodes within a DRG have a common cost distribution.

In developing casemix systems and defining classes within these system, two main objectives are that the class are "clinically meaningful" and "resource homogenous". The development process therefore typically involves clinical consultation to set and refine the structure of classes, and statistical analysis to assess the evidence around resource homogeneity. Earlier versions of DRGs also set a constraint on the number of classes, and most DRG systems have about 1000 or fewer classes in total.

This paper analyses and discusses an alternative approach to payment. This approach potentially separates and reframes the objectives of "clinical meaning" and "resource homogeneity". In terms of "resource homogeneity", the objective could be reframed to be that the payment system aims to

predict the resource requirements for an episode of care, taking into account factors considered to legitimately influence cost. With this objective, the prediction of the expected resources can be reflected in a score that is determined factoring in all information considered legitimate for predicting costs, and not constrained by allocation of the episode to a "class". The objectives for clinical meaning can continue to be achieved through the development of classes, but with a clearer focus on the clinical factors that are relevant.

Methods
We developed a simulation model to represent a hypothetical health system adopting the Australian Refined (AR-)DRG system. We used a subset of AR-DRGs and simulated episode characteristics and costs in 100 hospitals of different volumes of activity. Episode characteristics and costs were simulated based on available data that included the distribution of costs from Australian hospitals at the DRG level, with additional assumptions about variation in costs between hospitals. We applied the latest Australian cost weight calculations to estimate cost weighted activity for each hospital. We developed various regression and neural network models to generate an expected cost for each episode, taking into account predictors that were used in assigning the AR-DRG class and the cost weights. Expected costs were reflected in a score that, as with a cost weight, reflected the difference between expected costs and the mean cost across all hospitals.

We assessed difference (or error) between actual cost, funding using the standard methodology, and funding implied using expected costs from the prediction model. Differences were quantified as mean squared error and were explored at the hospital and adjacent DRG level.

Results
Detailed results will be presented at the conference. Our broad conclusion is that the alternative models will reduce mean square errors in funding allocation.

Discussion
The results of this simulation study illustrate several issues that need to be considered in applying machine learning models in a payment context. Other issues include achieving transparency in the model for generating expected cost, deciding on which predictors are considered legitimate influences on costs, and implementing complimentary approaches to address the clinical meaning objective.

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Thursday Morning

Nordic (3) Transition to ICD-11 (Nordcase)

Estonian experience in translating ICD-11 and thoughts on the implementation of the updated classification

Ruth Erm [a]

Abstract not available

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Preparing Sweden for the transition to ICD-11

Katriina Pernaa Bäckman [a], *Anders Jacobsson* [a], *Veronica Myrelid* [b], *Olafr Steinum* [c]

Introduction
Before Sweden switches from the 10th revision of International Classification of Diseases (ICD-10) to the 11th revision (ICD-11) in a few years, most IT systems that use ICD codes need to be upgraded and rebuilt, as they are not adapted to the new code format and the code clusters in ICD-11. Furthermore, processes for statistical analysis, indicators, follow-up and reimbursement systems need to be adapted as well. This work will take time and cost a lot, but in order for Sweden to have continuity in the flow of data, and to be able to continue coding correctly for analyses, comparisons and reimbursement without time gaps, the upgrade work must be done in the very near future. However, interest in and knowledge of ICD-11 and its code system varies greatly from region to region.

Methods
Region Stockholm and Region Västmanland have together created an introduction to ICD-11, an interactive training course available on the regional training portals.

There is a great demand among employees in Region Stockholm for information about ICD-11, while in Region Västmanland the interest seems to be very low. Our interactive introduction to ICD-11 is primarily intended for personnel with key role positions in health care management. Managers and other stakeholders, such as IT experts and information analysts, must be made aware that it is high time to start to prepare for the changes in future health care systems data management in the regions.

Conclusions
Our cooperation across regional borders with the introductory material will hopefully cover the basic need for information in regions where the interest in ICD-11 is great, and perhaps also start preparatory work in regions where the administration has not yet fully realized the extent of the coming change. In any case, this is a first step towards preparing Sweden to the coming ICD-11 implementation.

Examples and details from the training course will be presented.

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Casemix and clinical coding (1)

Challenges in Implementing an AI-Based Autocoding Tool to Enhance Coding Efficiency

Karen Pien [a], Maarten Lambrecht [b], Elric Verbruggen [c]

Introduction
At present medical coding is a manual process that is time-consuming and threatened by a shortage of skilled coders. Rule-based tools can assist in coding simple cases but often lack adequate coding quality. Artificial intelligence introduces a more complex way of assisting and even replacing the tedious manual coding process. In this article, a leading university hospital in Belgium describes how they collaborated with a third party to assist in the development of an autocoding tool and the challenges that were faced during implementation.

Methods
The autocoding software is based on Machine Learning and is able to predict ICD-10-CM and PCS codes for daycare stays. The University hospital's collaboration involved the extraction of historical discharge letters and MBDS data, pseudonymization of sensitive free text, development of interfaces and finally the deployment and testing of the tool in their own production environment. The whole coding team was involved in testing the autocoding tool on production data. Their role shifted from coding to a more supervisory role. The software utilized a sophisticated algorithm to identify multiple cases as suitable for autocoding, providing coders with an indication of the expected coding quality. Afterwards, an analysis was done based on the adjustments the medical coders performed on each case.

Results
The university hospital was a pioneer in successfully implementing this AI-based autocoding software in their production environment. The medical coders reviewed 740 cases from various specialties using the tool. Due to data drift, the performance was lower than expected, but still reached a F1-score of 67.6% for diagnoses and 65.5% for procedure codes. 120 (16.6%) cases were accepted without any changes. 215 (29%) only needed one code adjustment. 339 (45%) required two code changes. More complex cases were handled accurately. Data drift was handled by retraining the machine learning model on these reviewed cases.

Conclusions
The use of AI tools to code medical encounters is a promising technique that has the capability to code even complex cases. Machine Learning requires a lot of data to perform well, but the sensitive nature of this data makes it hard to collect. A relatively small training set, intercoder variability, and data drift are important hurdles to tackle. By combining the pseudonymized data of four hospitals, a larger training set was created which provided a significant performance increase. A real-time updating case confidence algorithm, based on coders actions, tackled the negative influence of intercoder variances in the golden standard. Data drift imposed a significant impact on coding performance. However, by retraining the model on the reviewed cases, its performance increased.

This study shows the performance of an AI-based Autocoding tool in a real-world healthcare setting. The implementation marks a paradigm shift in medical coding, offering a promising solution to the challenge of coder shortages. The study highlights the capabilities of the tool, but also emphasizes the hurdles, specific for the healthcare sector.

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[b] Solventum Health Information Systems, Europe & Middle East, Belgium
[c] MD, Solventum Health Information Systems, Belgium

Pilot experiences in the UK and Australia - Journey to Computer Assisted Coding and Automation

Cheryl McCullagh [a], Sharon Roumanos [a]

Introduction
Clinical coding and classification processes were established in an era of paper documentation. The way coding processes were built to standardise data collection were necessarily complex to harmonise disparate ways of working. In many countries, Electronic Health Records (EHR) and other electronic systems have created opportunities to innovate clinical coding collections for parts or whole of the health activity and engineer workflows to leverage advancements in electronically collected documentation and aid coders and automation where the sensitivity and confidence is high.

There is a shared vision between healthcare providers and technology companies to expand use of computer-assisted automation to ease the burden of clinical and administrative tasks and improve documentation and collection standardisation. This paper represents a cooperative industry, health service and academic collaboration to validate progress.

Methods
Beamtree has partnered with one Australian and two UK health services to pilot integration of historical and real-time structured (discreet value) and unstructured clinical/EHR data (clinical notes, pathology, radiology, medications) and apply rules written by expert clinicians and coders to link data sources to produce a coded summary. The results can be validated or automated by the human coder, creating standardisation and efficiency opportunities.

Results
In one UK hospital Beamtree has extracted and decrypted the full EHR, so it can be processed for assisted coding. We believe this is the first example globally. Machine leaning will be used to code four specialities which represent up to 28% of inpatient activity across maternity, newborn babies, paediatrics and simple elective surgery. Outpatient activity will be addressed in phase two. At another hospital Beamtree is addressing alternate case specialties.

Early results are showing up to 40% of selected groups could be automated (with 100% direct match of what a human coder would produce) and in adtion 30% more could be assisted (information available presented to the coder in the coding workflow with some input or review required) with minimal coder review to improve productivity and accuracy.

The presentation will include values that can be used for assisted coding, level of confidence in the output compared to human coding, assessment of gains/losses in efficiency/cost, and what is possible with further work.

Conclusion
Technology-assisted coding in all its forms will create collectively more standardised datasets, relieving the unnecessary burden of simple pattern recognition and freeing coders to work on complex clinical documentation, audit and discussion in the clinical setting. To move to automation, we may need to look differently at traditional models and standards of coding, and challenge historical standards to use more discreet value data. The way in which traditional coding standards are applied

may constrain automation opportunities. We need to be able to drive prototypes that might meet standards in a new way for a more reliable future. A more accurate and comparable coded output will improve the reliability of benchmarking and costing processes and ensuring equitable revenue distribution in health and the monitoring of safe health care.

[a] Beamtree, Australia

Solventum FileInspector - a toolbox for coding, casemix control and quality

Daniel Schmithausen [a]

Introduction
Solventum FileInspector is a software tool that is used in Germany by 980 institutions (hospitals, insurance companies) for casemix control, coding, batch grouping simulations in terms of coding changes and quality management.

Methods
Based on the German Minimal Basic Data Set §21, the case-related information is processed with the certified German aGDRG grouper. The application which can be installed locally or in a server environment has extensive output options in the form of Excel and text files as well as databases of various formats (MS SQL, SQLite, PostgreSQL, MS Access). A RuleEngine is integrated, which is maintained on an ongoing basis via all relevant master data with regard to classifications and variables. An associated RuleEditor enables users to create and manage extensive sets of rules (versioning, turn of the year). Rule sets can be drawn up on topics such as the quality of coding, plausibility checks of basic data and quality of medical care. However, simulation rules for the deliberate manipulation of case data (e.g. replacement, deletion, addition of diagnoses and procedures as well as adjustment of the length of stay) can also be created for precisely definable patient cohorts.

Results
Key performance indicators are case mix, other grouper flags such as PCCL as well as controlling-relevant process indicators, e.g. pre-/postoperative length of stay. These results are an essential part of regular reports for hospital management to manage operational processes and strategic planning, especially for prospective budgets. Coding quality metrics can be evaluated over time and regarding service lines and associated coding teams. It can also be used for monitoring document improvement purposes. The function of the simulation allows hospitals to identify individual areas for improvement in terms of coding and to measure their impact on the entire patient cohort.

The relatively high proportion of inpatient hospital treatment in Germany is being counteracted by new legal regulations. A set of rules is integrated into the 3M FileInspector that identifies potentially outpatient cases according to the official catalogs for outpatient procedures and treatments, but also allows other variables to be added by the user. Since all results are case-related, the results can be aggregated as desired (e.g. service lines) or linked to other topics such as quality indicators.

In projects with more than 500 hospitals in Germany and Switzerland, Solventum HIS uses FileInspector to determine quality indicators. Regulations such as the G-IQI (German Inpatient Quality Indicators) and PSI (Patient Safety Indicators) are used. In this context, different risk adjustment methods are used to calculate expected values.

Discussion

The Solventum FileInspector is a software tool that continuously adapts to the changing requirements and legislation in the German healthcare sector. For this purpose, a very high maintenance effort (Solventum regulations, current and historical G-DRG groupers, classifications) is carried out. With the prompt provision of new groupers and early mapping of new legal regulations for hospital financing, users are able to simulate the effects on their own organization.

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Casemix, quality and outcomes (2)

Assessing the effectiveness of cardiac rehabilitation in patients after myocardial infarction using national-level case-mix data

Borut Jug [a], Dalibor Gavrić [b], Irena Ograjenšek [c], Petra Došenović Bonča [c]

Introduction
National-level healthcare administrative data generated at every encounter with the public healthcare system are widely recognized as an underutilized resource for building knowledge to address macro, mezzo and micro-level challenges in healthcare. Data collected and curated by third-party public payers capture a wide range of variables with unique individual-level identifiers over a prolonged period of time. In countries with a single payer healthcare system like Slovenia such data are available for the entire population, hence representing rich sources of information about the real-world practice at a provider, regional, or population level that may be leveraged for diverse purposes. In this paper they are used to appraise the effectiveness of comprehensive outpatient cardiac rehabilitation (CR) programmes for patients after myocardial infarction that were initiated in Slovenia in 2017 to complement short-term residential CR. The results of this study can be used to inform the decision on the extension of the existing network of comprehensive outpatient CR centres.

Methods
Data on all patients hospitalised for myocardial infarction (ICD I20.0 and I21.x) in Slovenia between 2015 and 2021 were collected by linking (using unique patient identifiers) hospital, cardiac rehabilitation, medication, and survival status databases of the Health Insurance Institute of Slovenia. Propensity scores were calculated using logistic regression (for CR vs. no CR participation) with covariates plausibly associated with CR allocation and mortality - demographic characteristics (age and sex), hospital episode intensity, recorded co-morbidities, and medication prescription at discharge. Survival time was analysed using double-robust Cox proportional hazards regression (with propensity score weighting and covariates adjustment) to estimate hazard ratios (HR) and 95% confidence intervals (CI, from robust standard errors).

Results
Of the 11,815 eligible patients (75.6% of all hospitalized myocardial infarction patients, 66.7% men, median age 66, interquartile range 57-77), 3,819 (32.3%) attended CR. Participation to CR was associated with a significant risk reduction for cardiovascular rehospitaisation and all-cause mortality (HR 0.61, 95%CI 0.52-0.72, p<0.001).

Discussion
Our analysis seems to provide robust inference on the benefits of CR participation for patients after myocardial infarction as well as a useful framework for appraising real-life effectiveness of healthcare interventions from available datasets. The result indicate that CR is associated with improved outcomes suggesting that CR should be promoted and facilitated through the extension of the existing network of comprehensive outpatient CR centres.

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A Comparative Analysis of Case-mix and Hospital Tariff for Spontaneous Vaginal Delivery and Lower Segment Caesarean Section Cases in Three Different Types of Hospitals in Indonesia.

Maznah Dahlui [a], Mohd Hafiz Jaafar [b], Amirah Azzeri [a], Thinni Nurul Rochmah [c], Mohammad Helmi Mohamad Yasim [a]

Introduction
The Indonesian Case Base Groups (INA-CBG) is a system used in Indonesia for classifying and reimbursing healthcare service based on diagnosis-related groups (DRGs). However, the discrepancies between INA-CBG tariff and hospital tariff have raised concern among the hospital management. This study aims to determine the discrepancies between the INA-CBG and hospital tariff for spontaneous vaginal delivery (SVD) and lower segment caesarean section (LSCS) cases.

Methods
A cross-sectional study was conducted using the secondary data from three different hospitals in Surabaya, Indonesia. Data on the INA-CBG tariff, hospital tariff and cost components for each case-mix severity level for SVD and LSCS cases for year 2022 were collected. Descriptive and analytical analysis were done on the type of severity level, cost components and class for both cases. The final hospital tariff was then compared with the INA-CBG tariff for the respective hospital.

Results
There were about 643 (severity level I=473, II=162, III-8)and 771 (severity level I=358, II=411, III-2) SVD and LSCS cases respectively in a public university hospital (PUH), followed by 415 (severity level I=110, II=278, III-27) and 192 (severity level I=26, II=163, III-3) SVD and LSCS cases respectively in a public state hospital (PSH) and 95 (severity level I=88, II=6, III-1) and 28 (severity level I=24, level II=4) SVD and LSCS cases respectively in a private hospital (PrH).

For SVD cases, the average discrepancies between hospital tariff and INA-CBG tariff recorded for PrH was 32.55 % (severity level I=30.06%, II=52.08%, III-20.47%), for PUH was 76.67% (severity level I=78.76%, II=79.36%, III-77.51%), and for PSH was 70.57% (severity level I=76.02%, II=75.88%, III-59.81%). Similarly, huge discrepancies were also observed for LSCS cases. The average discrepancies between hospital tariff and INA-CBG tariff for PrH was 54.52% (severity level I=53.68%, II=57.02%), for PUH was 79.61% (severity level I=79.00%, II=77.46%, III-87.88%), and for PSH was 66.36% (severity level I=62.76%, II=64.96%, III-73.95%).

In all three hospitals, the main cost component for SVD cases for severity level I and II were surgical procedures while for severity level III it was mainly contributed by the cost for medications. However, for LSCS cases, the main cost component recorded were different from each hospital. For PrH, the main cost component was services for both severity level I and II. While for PUH and PSH, the main cost component was surgical procedure and non-surgical procedure respectively for all severity levels.

Discussion
In this study, huge discrepancies between hospital tariff and INA-CBG tariff were recorded for both SVD and LSCS cases for all severity levels in all three hospitals. Compared to the public university and state hospitals, the discrepancies recorded by the private hospital were the lowest. This was because the private hospital had performed the costing calculations exercise in determining their hospital tariff for both cases. In addition, different cost drivers were also recorded for LSCS cases for all three hospitals possibly due to different terms and definitions used to define cost components recorded for each hospital. In conclusion, costing calculations exercise should be conducted and

revised to ensure that the discrepancies between hospital tariff and INA-CBG tariff were not markedly difference.

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Update on the Charlson and Elixhauser conditions as predictors or 12-month mortality

Patrick McElduff [a], Jim Pearse [a], Deniza Mazevska [a]

Introduction
The Charlson Index is a widely used co-morbidity score for hospitalised patients, initially developed to include patients with co-morbidities into clinical trials (Charlson et al., 1987). It was derived from a study of 604 patients and validated using a separate cohort of 685 patients. A 2021 review found over 36,000 citations of the index, noting 15 subsequent adaptations (Charlson et al., 2022). In Australia, the Charlson index informs hospital pricing adjustments for complications and readmissions.

However, the index's transferability to different populations is debated, as original data were from a single hospital (Romano et al, 1993). Changes in mortality for some conditions over time, like the decreased mortality risk for AIDS, further question its current applicability.

Elixhauser et al. (1998) created an alternative co-morbidity index based on data for more than three million hospital separations. They identified a list of conditions which could be used for casemix adjustment. They used hospital outcomes, but many authors argue it is a better predictor of 12-month mortality than the Charlson Index. However, it was also developed a long time ago and has AIDS as a very high-risk condition.

Methods
A linked dataset of over 3 million randomly selected Australians aged over 15 years was created for the evaluation of the Health Care Homes trial. The dataset contains all hospitalised episodes for people in the sample that occurred between January 2015 and July 2021. We selected the first overnight hospitalised event in 2015 as our cohort. We compared the performance of the Charlson and Elixhauser conditions for predicting 12-month mortality, readmission within 12 months, and having a hospital acquired complication (HAC), with and without the addition of demographic adjustors.

Logistic regression was used to model each outcome. The Area under the Receiver Operator Characteristic Curve (AUC) was used as the metric for comparing models.

Results
There were 199,667 hospitalisations and 7.1% died within 12 months. Almost half the people had another hospital episode within 12 months, and 4% experienced a HAC. Age and sex together (AUC = 0.804) were better predictors of all outcomes compared with the Charlson score (AUC = 0.737) and the conditions included in the Charlson score (AUC = 0.747). When the Charlson conditions were added to the model with age and sex the AUC increased to 0.868, which was similar but slightly lower than when the model with the conditions in the Elixhauser score added to age and sex (AUC = 0.878).

The pattern was similar for the outcome of readmission to hospital within 12 months. However, the Elixhauser conditions (AUC = 0.830) performed better than the Charlson conditions (AUC = 0. 749) when added to the model examining the predictors of having a HAC, which also included age and sex.

Discussion

These finding are consistent with other studies. The Elixhauser conditions perform as well as, if not better than, the Charlson Conditions when predicting 12-month mortality. A surprising finding was that the Elixhauser conditions were much better predictors of a person having a HAC than the Charlson conditions.

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Casemix funding/ activity based funding (3)

Developing and deploying a Patient Level Payment System for Public Patients treated in Private Hospitals. - The UAN Website System

Brian Mccarthy [a], Paval Kuriakose [a], Phil Dunne [a], Richard Ryan [a], Joe Hunter [a]

Introduction
In Ireland, most admitted healthcare occurs in one of 54 Public Hospitals, with the remainder admitted to one of 19 Private Hospitals. In common with many other countries, the combination of the ageing demographic and the delayed treatments due to the global pandemic have meant that public hospitals regularly operate at over 95% capacity. The Health Service Executive (HSE) and the Department of Health in Ireland have funded several programmes to allow scheduled care patients waiting for treatment to be treated in Private Hospitals. However, the funders would like to see the detailed outcomes of the funding.

The UAN system was developed by the Healthcare Pricing Office in the HSE to record and track admissions to private hospitals, facilitate the submission of claims for these admissions and reimburse the claims. The detailed record of the admissions and claims ensures that every euro can be tracked.

Methods
A UAN is a Unique Authorisation Number and represents a commitment to treat a patient in a private hospital. Private hospitals do not get paid for treatments unless the patient has a UAN.

The UAN website system was developed to ensure data collection standardisation and to facilitate both the reporting of the referrals and the funding of these referrals. The website consists of five distinct parts

- The UAN referral system allows Public hospitals to refer patients to Private Hospitals
- The HSEClaims system, allows Private hospitals to record patient activity details and submit claims
- The claims management system to review and adjudicate the claims
- The payment system to reimburse for the activity
- The reporting system to report on all aspects of the process.

Finally, for the system to function in a fair and cost-effective manner, a set of treatment costs were agreed with the private hospitals using a national procurement process.

Results
The system went fully live in mid-2022 and has been operating for nearly two years. Public Hospitals access the UAN Referral system to refer patients. Private hospitals access the HSEClaims system, allowing them to submit online claims for the referred patients. The HSE central team use the claims management system to assess claims and payments are made via the HSE financial systems. All parties receive reports on the system.

Nearly 3000 patients have been referred, treated, claimed, adjudicated and paid. The success of the system and the capabilities of the process have led to expansions to cover the referrals of Assisted Human Reproduction patients, outpatient waiting list patients and Medical Bed patients (i.e. non-surgery).

Over 500 users have accessed the system from both Public hospitals, Private hospitals and the central team.

Discussion
The development and deployment of this system was a significant initiative in the HSE as there was no in-house ability to process and pay claims prior to this. The system is a resounding success and is operating well, thanks to the development team in the HPO who manage the system and assist the users in their access and use. It is planned that additional cohorts of activity, funded by the HSE and the Department of Health, will be included from time to time as the system progresses.

The immediate plans for the system are to increase the reporting capabilities and to expand the range of activity covered by the system. More long-term plans include improving the accessibility of the system without compromising security and enabling the capture of clinical data using an appropriate clinical classification.

The overall aims of the project, i.e. to allow the referral of patients, to accept claims for the patients, to assess and reimburse the claims and to report on the process, occur each day and everyone is satisfied with the operation of the system (so far).

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Implementation of AR-DRG reimbursement for public providers contracting in Saudi Arabia's mandatory private health insurance scheme

Husein Reka [a], Abdullah Almaghrabi [b], Omar Alshanabah [c], Shabab Alghamdi [d]

Introduction
The Council of Health Insurance (CHI) in its efforts for more transparency and standardization of the Saudi private health insurance scheme, in 2021 mandated for the first time AR-DRG as a billing mechanism for public hospitals treating private health insurance beneficiaries. This was the first ever usage of AR-DRG in the country to reimburse for rendered services and as part of the overall CHI strategy to implement this system in the private sector as well.

As there were no readily available cost data to design a price list, CHI had to revert to existing claims data to devise relative weights, base rate, average length of stay, and funding rules. This required collection of claims data, cleaning, processing, manual mapping and credibility checks to produce the minimum requirements for an AR-DRG based price list.

This paper explains the approach, methodology and lessons learned in devising a price list based on AR-DRG patient classification for purchasing services from public providers in a context of unavailability of readily available cost data.

Methods
Claims data on admitted encounters covering January 1 2018 to December 31 2020 period were acquired. An initial assessment of claims data was conducted to determine which claims are credible for manual mapping at A-DRG and AR-DRG level where possible using AR-DRG v9.0 grouping logic. Further refinement of assigned A-DRGs was done where a high potential of overlap between procedural and medical admissions was identified, and surgical and medical flag was assigned. Further validation of appropriateness was done by looking at the cost distribution within these DRGs.

The final step of clinical mapping review entailed reviewing of assigned A-DRGs in terms of completeness, consistency, and accuracy.

Once the final dataset completed, billed amounts within the 95% confidence interval were applied for each A-DRG to eliminate outliers, resulting in A-DRGs having number of encounters assigned, mean billed amount, and percentile distribution of billed amounts. This enabled the calculation of the base rate and relative rates, which were further assessed for credibility and manual overrides. Finally, we conducted reasonability check of relative weights and prices with different publicly available sources of comparison. Length of stay analysis was conducted to inform funding rules for the price list.

Results
The final cleaned claims dataset used for this exercise included 895,150 admitted encounters with claimed value of USD 2.3 billion. The trended base rate for 2023 was USD 3,662 (1,278-7,849 5th and 95th percentile).

Correlation analysis was conducted with Australian AR-DRG v9.0 2019/20, Abu Dhabi IR-DRG 3.01 and Johns Hopkins Aramco AR-DRG v9.0 2017/18 resulting in high correlation (0.96, 0.92 and 0.96 respectively) in addition to national costing study outputs.

A set of funding rules addressing, trimming points, outlier reimbursement, same-day admissions and add-on payments were established based on data analysis.

Sensitivity analysis was conducted to assess the extent of manual intervention on the financial impact entailing different scenarios and model assumptions.

Throughout the entire process, all stakeholders were involved through workshops and change management sessions for a successful implementation of activity-based funding in the public sector.

Conclusions
AR-DRG payment mechanism is a feasible and not complicated system to apply for reimbursement of health care services even in situations when costing data are not available. The evidence and experience from IR-DRG introduction in United Arab Emirates demonstrated the value of using claims data as an initial approach in devising DRG based fee schedule. The evidence and experience with this project confirm the practicality of using claims data for AR-DRG based fee-schedule for activity based funding as a stepping stone for future improvements and refinements.

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[d] Secretary General, Council of Health Insurance, Saudi Arabia

Assessing funding inequalities between elective and urgent surgeries of the musculoskeletal system in French funding mechanisms.

Pierrick Charbonnier [a], Joëlle Dubois [a], Bastien Fages [a], Catherine Le Gouhir [a], Nathalie Rigollot [a], Véronique Sauvadet [a], Raphaël Schwob [a]

Introduction
For a given medical speciality, an unplanned hospital stay is on average longer and more severe than a

planned stay. Additionally, the unplanned stays are mostly taken care of in some hospitals when others only do planned stays: forcing the formers to treat less patients than they could, with similar capacities, to face emergencies that could arise. Furthermore, the funding for a hospital stay does not consider whether it is planned or not in the French funding system.

Methods
In this study, we considered the example of the musculoskeletal system surgery as any hospital that can perform urgent surgeries could also perform elective surgeries with similar material and staff.

We, firstly, sorted the case mix between planned and unplanned surgeries. Then, we estimated the characteristics of the planned surgeries that each hospital could perform.

We estimated how many more elective surgeries a given hospital could perform with the same staff and capacities in two scenarios. In a first scenario we considered that the stays associated with urgent surgeries had similar characteristics (e.g., length of stay) than the stays of the elective ones. Then, we assessed a scenario in which every hospital treated only elective surgeries.

Lastly, we estimated how much more fundings the hospital would get in both scenarios with the new case mix.

Results
According to both methods 87% of hospitals with musculoskeletal system surgery could earn more fundings by switching part or all their urgent surgeries to elective surgeries in this medical speciality.

In the first scenario (resp. second scenario) 50% of hospital would earn between 0.5% and 19.9% (resp. between 3.4% and 37.1%) more fundings than they currently do. In addition, 25% would earn more than 20% (resp. 37.1%). The results between both methods highly correlate but the second one shows significantly higher levels of correction.

Discussion
On the one hand, the differences between the results of both scenarios demonstrates the difficulty to estimate to which extant the hospitals lose fundings by doing unplanned surgeries instead of planned surgeries. On the other hand, we demonstrated than cu rrent

funding mechanisms benefit hospital with high percentages of planned surgeries. The exact degree to which some hospitals benefit from the current funding mechanisms remains unanswered with this study.

The findings of the study may help to create an additional funding mechanism to better fund the urgent surgeries. These fundings could help the hospitals to better face emergencies. Additionally, it could give incentives to the hospitals not treating patients with urgent surgery needs today to perform more of these surgeries. Hence, balancing more efficiently the constraints between the hospitals.

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Thursday Early Afternoon

Nordic (4) Future challenges and developments (Nordcase)

Developing financing systems to deal with future challenges

Eva Wensaas [a]

Abstract not available

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Integrated care and digital health care services related to the case-mix and financing system in Norway

Kristin Dahlen [a]

Abstract not available

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Diagnosis related grouping in assessing the effectiveness of integrating social and health care services - the importance of casemix for the comparability and usability of the results

Miika Linna [a]

Abstract not available

[a] University of Eastern Finland, Finland

Is casemix systems still relevant in a fully tax financed healthcare system?

Pernille Rosling [a]

Abstract not available

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Challenges and Innovations with Cost Data and Funding

A machine learning approach for outlier detection in cost data used for RIW regression models in Canada.

Koffi Kpelitse [a], Rachel Zhang [a], Victoria Zhu [a], Sheril Perry [a]

Introduction
The Canadian Institute for Health Information (CIHI) uses the acute care Canadian Patient Cost Data (CPCD) to derive resource intensity weights (RIWs) for its acute inpatient and ambulatory case-mix grouping methodologies (Case Mix Groups+ (CMG+) and Comprehensive Ambulatory Classification System (CACS)). RIWs are relative cost weights and are critical for acute care management and planning. CIHI is reviewing the current non-statistical and statistical criteria used to identify outliers in RIW calculation data, exploring alternative approaches that are less likely to disproportionately classify high-cost records as outliers, which impacts the overall RIW values.

Methods
Three popular unsupervised machine learning (ML) techniques were explored as alternatives to detecting outliers in CPCD data: Isolation Forest (IF), Local Outlier Factor (LOF) and One-Class Support Vector Machine (SVM). These three methods were tested using inpatient care data from fiscal years 2016-17 to 2018-19. For each ML technique, various specifications were tested with different outlier thresholds using various combinations of total cost per patient stay, length of stay and per-diem cost as input features.

For each iteration, the performance of the three techniques is measured by comparing the distributions of inliers and outliers and the exclusion rates for low-cost and high-cost records.

Results
Out of the three ML approaches explored, SVM proved to best fit the needs of identifying extreme cost data with a reasonable balance between case variation and costs. Both the IF and LOC approaches appeared to under-edit the low-cost records and over-edit the high-cost records.

Models that incorporated patient cost per stay, length of stay and per-diem costs as input features performed the best. Although these features are highly correlated, the SVM classification performed with high tolerance and minimal impacts were identified.

With the SMV method and selected modeling variables, an ideal percentage of cases is determined to be excluded, without compromising the quality of the resulting resource estimates. The details of the extent of cost data conservation for RIW calculation will be presented.

Additionally, the decision boundary created by the SVM method resulted in similar proportion of exclusion rates for the vast majority of the CMGs. The CMGs with high outlier rates are generally associated with low volumes or extreme high-cost cases.

Conclusions
The SMV approach to outlier detection appears to be an effective way to identify acute patient cost data outliers for cost weight production. This approach not only simplifies the data preparation process, but also provides data-driven evidence to control the volume of data points being excluded without compromising the predictive ability of the regression output. The next step will be to test this approach to outlier detection with the ambulatory acute CPCD data.

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Calculating economic outcomes of using innovative technology using a novel health-economic modeling tool

Virginia Merico [a], Michael Wilke [a]

Introduction
In decisions concerning the adoption of healthcare innovations, the decisive assessment pertains to the comparative efficacy and economic feasibility against the current standard of care. A new procedure seems an economically viable alternative if it offers direct cost reduction or yields savings in infrastructure and personnel resources.

In health-economic evaluations, Markov models have served as proven methodology. These models visually represent the singular steps of the patient pathway as decision trees, with "knots" (or "branches") representing treatment alternatives or outcomes deviates, such as the choice between existing and new procedures or the grouping to different DRG codes. Markov models are commonly built using conventional software tools such as Microsoft Excel today. However, because Excel cannot model the multitude of interconnected variables interactively, manual modelling can often take several days and even a later adaptation becomes time-consuming. To address these challenges, a specialized, interactive tool for mapping variables along the patient pathway is needed.

Methods
PathModeler is a pioneering web-based tool for the expedited design of interactive health-economic models and the standardized integration of data. It contributes to a reduction in manual effort and enhances calculation efficiency, enabling to quantify the added benefit of novel therapies through the augmented comparative presentation layer.

First, PathModeler reflects the inherent complexity and variability of the patient pathway. Each step of the treatment which lead to divergent resource consumption or payment as well as treatment variables (e.g. proportion of cases with overnight stays) represents nodes in the model. Second, current costs, personnel time, length of stay and reimbursement of specific DRG codes are retrieved from official databases and integrated into the model. Third,

scenarios specific to hospitals - with individual process times, codes population, and average length of stay - are created and compared. This practical assessment allows to draw conclusions on the impact on resources and financials.

Results
A pertinent case study focused on the health-economic modelling of the new cardiac ablation closure system (Perclose(tm) ProStyle(tm) by Abbott Medical) in Germany which prevents complications and enables earlier post-operational discharge. When applying the closure system in 75% of cases, PathModeler showcased the potential to reduce length of stay per case by 2,35 days and nursing time by 786 minutes per case, among others, compared to the German average. The innovative adoption results in a differential profit of 13,850 € and total saving of 2,261 hours nursing hours on 300 patients compared to Z-sutures and pressure bandage where patients have to lie flat for approximately 6 hours..

Discussion
The quantification on the added health-economic benefit facilitates stakeholders' decision-making in the adoption of innovations. Further considerations pertain to the capability to assist higher patient volumes, which could also be calculated using PathModeler.

The use of a specialized, interactive modelling tool allows for displaying not only the health-economic superiority of an innovative intervention compared to the standard-of-care, but also the numeric conditions under which the adoption remains economically viable. Intricate data can be hereby distilled into value messages, affording clarity in communication and visual representation for stakeholders.

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Cost of Intermediate and Long-Term Care: Which Payment Method for Thailand?

Krittika Khotthong [a], Arthorn Riewpaiboon [a], Sitaporn Youngkong [a], Supasit Pannarunothai [b]

Introduction
Intermediate and long-term care (ILTC) patients are people of all ages with diminished functional ability due to mental or physical illness and disability, requiring intermediate-care (IMC) or long-term care (LTC) to resume health. The increasing number of ILTC patients tends to cause catastrophic expenditures in Thailand's healthcare system. Additionally, Thailand has only used DRG to pay for inpatient care, which does not reflect the costs of ILTC. This study aims to analyze the costs of ILTC compared to the payment.

Methods
A cost analysis of healthcare services was conducted from a provider's perspective with a micro-costing approach. ILTC patients were recruited from eight public hospitals in 2018 and 2019 by the primary and secondary diagnoses (ICD10) corresponding to nineteen groups of IMC and twenty-one groups of LTC based on the review literature. Then, the hospitalized

patients with one admission were selected for the analysis. The treatment cost per admission was estimated in 2019 value. The data were summarized using descriptive statistics. Furthermore, the stepwise multiple regressions were employed to create a cost function. The independent variables are the case type (IMC or LTC), types of national insurance scheme (NIS), groups of diagnosis, and DRG adjusted relative weight (AdjRW) (categorized into >0 to 1, >1 to 2, >2 to 3, >3 to 4, and >4).

Results
14,413 ILTC patients were included, of which 43% were female. The patients comprised 44% of IMC and 56% of LTC. The average age was 57 (+22) years of IMC and 41 (+22) years of LTC. The length of stay was 5.92 (+8.75) days for IMC and 4.67 (+7.28) days for LTC. The average AdjRW was 1.12 of IMC and 0.07 of LTC. The average costs per admission of IMC and LTC were USD909 (+1,380) and USD601 (+ 990), respectively (USD1 = 31.04 Thai baht). The cost model had an adjusted R^2 of 0.44. The predictor variables were all levels of AdjRW, fifteen diagnosis groups (of 38 potential groups), and the social security scheme. The case type (IMC or LTC) was not significant. The fitted costs per AdjRw of levels of >0 to 1, >1 to 2, >2 to 3, >3 to 4, were USD769, USD825, USD824, USD763, and USD613, respectively. Compared to the current payment per AdjRW (USD269 for general patients and USD387 for high-risk patients), the costs of ILTC are higher than the payment rate by 61% to 70% and 44% to 57% for general ILTC and high-risk patients, respectively.

Discussion
Even though the healthcare reimbursement policy was adjusted for the high-risk disease of ILTC, all of the ILTC costs are still over the NIS payment. So, it is necessary to develop a new national payment policy for ILTC to turn catastrophic expenditure conditions to a value-based healthcare system in Thailand.

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Challenges of Serbian DRG costing

Simo Vuković [a], Drasko Lazović [a], Marina Topalovic [a], Mirjana Milošević [a], Biljana Trivić Ivanović [a]

Introduction
The purpose of this paper is to present the challenges related to piloting the development of the methodology for calculating the costs of hospital services in Serbia. Given that the reform of the health system implies the improvement of the entire system of financing the public healthcare providers, designing the costing methodology is particularly complex. The challenges are related to the context of the current retrospective planning and historical budgeting, with the application of the DRG financing model (since 2019), which implies that 5% of a hospital's annual budget depends on its performace.

Methods

The data on costs collected from 13 hospitals, one of which is a university clinical center, have been used to determine DRG base rate and DRG cost weights. A total of 453,640 cases have been analyzed, along with data on costs, case-level invoices, and additional data from hospitals' reports on cost centers.

Results

Afted calculating the DRG base rate and new cost weights, a simulation of the costs calculation has been conducted for 13 hospitals, along with an analysis of the differences in each category of hospitals compared to the current DRG financing model. As a result, the methodology for the calculation of the DRG cost weights in Serbia has been developed. It has been developed in accordance with all available data related to costs. Due to the unavailability of all the necessary data, three key challenges have been singled out which are related to: 1) the lack of data related to the duration, in minutes, of operative procedures, 2) the lack of data related to the duration, in minutes/days, of the use of intensive care and 3) differences in all types of costs at the patient level. The results showed that the average cost per a DRG is not necessarily in accordance with that DRG's consumption-related features.

Discussion

The quality of the data and thus the result was significantly affected by the fact that one of the observed hospitals, which participates in the cost matrix of all hospitals with 28.3%, did not allocate costs to the operating room and intensive care. In addition, there are differences in all types of costs at the patient level, for example the tariff for inpatient doctors' salaries in different hospitals. One of the conclusions is that it is necessary to adhere to the rules of coding according to DRG and to conduct cost analyzes at the patient level.

[a] SECRP Serbia Emergency Covid Response Project, Serbia

Classification development (1)

Innovation in classification development - The Australian Non-Admitted Patient Classification Project

Laura Harris [a], Dominic Tate [a], Georgina Young [a]

Introduction
Non-admitted services play an integral role in the health care continuum, providing accessible and timely health care to patients, while also contributing to overall efficiency and sustainability of the health care system through early detection and better disease management, which leads to improved health outcomes.

In Australia non-admitted services are currently classified using the Tier 2 Non-Admitted Services Classification (Tier 2).

Tier 2 categories a hospital's non-admitted services into classes based on the nature of the service provided and the type of clinician proving the service. Due to Tier 2's provider centric structure and lack of patient characteristics and complexity measures, there is need to develop a new classification.

In March 2023, Australia commenced the development of a new patient-centred non-admitted care classification. The ANAPP aims to develop a new classification through utilising existing clinical data obtained from hospital electronic medical record (eMR) systems.

Methods
The ANAPP aims to leverage health information available in eMR systems, other information systems and applicable cost data to develop a comprehensive cost and activity data set to underpin the development of a patient-centred classification. This includes the exploration and use of natural language processing (NLP) techniques on large unstructured datasets to deliver useful insights and analysis.

The ANAPP is comprised of four stages:

- Stage One: Investigation and consultation - consultation with jurisdictional health departments to determine the feasibility of utilising data collected from eMR systems, considering data security, privacy and ethical requirements and the ability to link activity data with corresponding cost data.
- Stage Two: Proof-of-concept - development of a data model and methodological process to conduct a technical proof-of-concept to extract data from jurisdictional eMR systems, including transforming unstructured data into a useful format.
- Stage Three: Data collection and final data sets - collection of data from jurisdictional eMR systems and cost data from established sites, and development of a final activity and cost data set.
- Stage Four: Analysis and classification development - rigorous statistical analysis and the development of a classification system for non-admitted care.

Results
Stage One: Investigation and consultation of the ANAPP is complete. The findings from Stage One determined:

- it is feasible to utilise the rich data held in eMR and other information systems to develop a new classification.
- appropriate measures must be undertaken to ensure privacy is maintained, and ethical issues are addressed, and data is secure jointly with participating jurisdictions.
- further investigation and trialling of NLP methods must be done to support the collection of data from jurisdictions.

Stage Two: Proof-of-concept of the ANAPP is currently underway.

Conclusions
The ANAPP is utilising innovative strategies to develop a new, patient-centred non-admitted care classification. By leveraging health information available in jurisdictional eMR systems the ANAPP aims to minimise the administrative burden on clinicians and hospitals, and the impact on clinical service delivery that is associated with traditional classification development.

[a] Independent Health and Aged Care Pricing Authority, Australia

A new case-mix based payment system for the psychiatric day care sector in Switzerland: Proposed methods for the development of an adequate tariff structure

Samuel Noll [a], Mischa Hintermann [a], Simon Hölzer [a]

Introduction
In many European countries, there has been a shift towards outpatient psychiatric care over the past decades, as it is more cost-effective and resources for health care are limited. Switzerland, however, still has a high number of inpatient psychiatric hospital beds and a comparatively high average length of stay. The existence of differing remuneration systems between inpatient and outpatient settings creates a distortion of incentives regarding the choice of treatment setting and an inefficient allocation of resources. The casemix office, SwissDRG Inc. has proposed a new remuneration system for day care treatment that addresses these issues[1].

Methods
In Switzerland, the TARPSY tariff structure has governed the remuneration of inpatient psychiatric services since 2018[2]. The proposed tariff structure for day care treatment was assessed using data from the inpatient sector for the years 2018, 2019, and 2021[3]. The method involves three steps: estimating the day care treatment setting potential by delimiting cases from the inpatient patient data, adjusting the costs of this subset to approximate a day care treatment setting, and calculating daily cost weights based on the existing cost weights.

Results
A daily cost weight could be calculated for 21 cost groups in psychiatry. These cost weights vary between 46 and 53% of the corresponding inpatient (daily) cost weight (TARPSY Version 4.0). Thus, the resulting reimbursements in an outpatient setting are estimated to be about half of the inpatient reimbursements.

Discussion
To implement the tariff structure, a number of framework conditions and regulations must be defined or modified. Additionally, subsequent cost data surveys from the day care setting can be incorporated into the calculation as part of a learning system. The day care remuneration system could potentially be applied for day care psychiatry in other countries with DRG systems, especially in countries with conflicting remuneration systems in the inpatient and outpatient sector.

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[3] The year 2022 could still be added until the presentation.

[a] SwissDRG AG, Switzerland

The PopGrouper: Development of a population-based classification system for the cross-sectoral determination of morbidity-related care needs

Karen Kinder [a], Wilm Quentin [a], Ulrike Nimptsch [a], Chrissa Tsatsaronis [a], Anika Kreutzberg [a], Reinhard Busse [a]

Introduction
To improve the needs-based nature of care, knowledge of the distribution of morbidity-related care needs is crucial. Germany lacks such a suitable analytical instrument to assess population needs. Internationally, the need for care is often determined with the help of population-based classification systems. Such classification systems (cell approaches) assign each person to exactly one group that is intended to make medical sense and to bring together insured persons with similar need for care (economically homogeneous). This presentation describes the status of the development of the PopGrouper which was initially presented at the 2022 PCSI conference.

Methods
The PopGrouper was developed using medical expertise and analyses of claims data from more than 9 million German sickness-fund insured persons. In the first stage of development, Consolidated Disease Groups ("Zusammengefasste Krankheitsgruppen", short ZKGs), which

group diagnoses in a medically meaningful way, were defined and validated by experts from scientific medical societies. Since an individual can have multiple diagnoses, several different ZKGs can be assigned to a person. In the second stage, all persons were divided into mutually exclusive groups based on their diagnoses and other relevant characteristics. For this purpose, 10 higher-level "Macro Base PopGroups" (MBPGs) were first defined to segment the population by particular needs or severity levels. Across all MBPGs, approximately 400 "Base PopGroups" (BPGs) and roughly 1000 more granular PopGroups (PGs) were defined using decision lists and regression trees with costs as the target variable. In the final development stage, 10 economically driven "Meta PopGroups" were defined.

Results
Initial versions of the PopGrouper have been developed and a third version (V0.3) will be completed and presented at the time of the presentation. Application trials are planned for various areas, including 1) cross-sectoral health care delivery planning, 2) regional comparisons of quality and efficiency, 3) the evaluation of interventions, and 4) case management applications. Proposals for institutionalization in the German health care system are to be developed in 2024.

Discussion
The PopGrouper will be continuously revised and improved throughout the project based on the results of the application tests. In this session, initial results and the grouper will be presented and discussed.

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Reforming the German hospital system: A paradigm shift in patient classification?

Natascha Andres [a]

Introduction
For more than 20 years, the reimbursement system in Germany has been based on DRGs, hence one of the most essential datapoints for decision-making is case mix related data. Initially, the DRG system was introduced to increase standardization and comparability between different healthcare providers, as well as to reduce an unequal distribution of resources. Besides diagnoses and treatments, effort and cost data have been established and used as patient classification indicators.

Now, the healthcare system, especially in inpatient care, is facing major financial challenges, with the current reimbursement system being one particular point of criticism. In response, the German Minister of Health announced a multi-dimensional hospital reform plan, which includes the discontinuation of the DRG-based remuneration system. In the future, 60% of funds should be allocated by quality-driven medical service groups using defined budgets, while only the remaining 40% of funds should be financed using the existing DRG-based fee.

So far, DRG's are aiming for a certain level of standardization and comparability regarding

financial aspects. This financial homogeneity is not necessarily the aim while developing and using medical service groups. Rather, medical service groups aim to cluster services which are homogenous from a quality perspective. Quality criteria for medical service groups could be personal requirements, required infrastructure or the level of complexity of the involved diagnostic and therapeutic components and are therefore not in line with the financially driven patient classification criteria of the currently in use DRG's. With this change in the remuneration system, there will also be a significant shift in patient classification and its methodologies.

Discussion
Implementing different quality-driven medical service groups is likely to lead to a pyramidal hierarchy of service groups. Higher levels in such a pyramid will involve a higher level of complexity and will therefore require specialization in areas such as training and medical equipment. This will be reflected in different service levels for healthcare providers. Using this effect, medical service groups aim to increase the overall quality of service provision. However, this requires an additional level of (patient) classification that does not currently exist. It is currently unclear how this additional level will be established, which means that this hospital reform is leading to unanswered questions for individual hospitals and the German healthcare system in general such as:

1. Which methods that can be used to define quality-related patient classification indicators? In what ways can existing case mix data be used as a patient classification indicator?
2. Are quality-related indicators suitable to replace or enhance case mix data when it comes to managing hospital cost? How can quality-related indicators be used in conjunction with case mix data to improve the management of hospital expenditures?
3. To what extent will quality-based reimbursement influence the overall healthcare expenditure for inpatient services in Germany? Which factors will determine the impact of quality-based reimbursement on healthcare expenditures, and how can these factors be managed to ensure the most effective use of healthcare funds?

[a] KPMG, Germany

Are Patient Classification Systems ready for Medicine's Second Great Hippocratic age?

Mary Black [a]

Introduction
Clinical coding is the task of transforming medical information in a patient's health records into structured codes that can then be useful. In Ancient Greece, Hippocrates promoted a dialogue between patient and physician[1]. Categories within the medical history have been largely stable since then: presenting complaint, history of presenting complaint, past medical and surgical history, medications, family history, social history (to include smoking and alcohol). A more detailed 'systems review' has developed over time, in which each medical

and surgical sub-speciality requires another list, akin to the expansion cards in a multi-player board game. The advent of laboratory tests, radiography, scans, and exploratory interventions adds further robust and verifiable evidence. Genetic testing allows us to interrogate the genome. Machine learning and artificial intelligence offer the possibility to interrogate and draw together large and disparate sources of information, to predict outcomes, and even to create patient avatars. We live in the age of the expert patient. We also live in the age of misinformation and too much information.

The PCSI conference is one of the few venues where those interested in patient classification systems can discuss fundamental questions. Is the age of reductive and precise coding now over and are we about to take a massive leap back to Athenian principles? Also, where will truth and trust lie in a hybrid machine/human world where data is increasingly open and available?

Methods

I will briefly outline the major shifts in patient history taking, examination and testing and map them against clinical coding system principles. I will refer to the role of key players in the classification systems and how ownership and curation of information has changed. I will consider what changes will come next with the application of machine learning and the dawn of artificial intelligence and how this might affect clinical coding systems.

Results

A resurgence in the interest of developing a shared patient 'story' through narrative medicine[2] brings us brings us full circle back to the holistic approach advocated in ancient Greece. The six principles are 1) action toward social justice, (2) disciplinary rigor, (3) inclusivity, (4) tolerance of ambiguity, (5) participatory and nonhierarchical methods, and (6) relational and intersubjective processes. The role of technology, both in record -keeping, data analysis and predictive medicine is proving to be both a tool and a game-changer. The next wave of development involves three major changes. The internet of things allows continuous tracking of biometric data. A shift to predictive medicine based on logarithms that incorporate medical data and genetic analysis can establish the risk profile of an individual for future disease. Finally, the use of diagnostic assistant tools powered by AI will sift through all available evidence to produce what was formerly the sole province of the clinician. I add to this the voice of the patient, both to supplement the information available and also to challenge it.

Discussion

Patient classification systems translate available evidence from the official patient record into standardised alphanumeric codes, with an emphasis on accuracy and standardisation. Major underlying shifts in approach impact now on the coding systems we work so hard to maintain. Technology opens the door to a much wider consideration of health related data[3]. Classification systems need to adapt as we embrace a holistic approach and enter medicine's second great Hippocratic age.

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Value based management

Province wide implementation of patient level costing: foundational to Patient-Based Funding and Value Based Healthcare.

Christian Pepin [a], Charles Cockburn [a]

Introduction
Implementing patient level costing across the continuum of care, provincewide, is foundational to Patient-Based Funding, allowing for more transparency in resources allocation, and the organisation of care and services. Combining clinical costing data and patient outcomes enabled a robust data tool that lays the groundwork for value base healthcare management. Here is the example of Québec province in Canada.

Methods
In 2014, an Expert Panel proposed to the government a strategy to support patient-based funding implementation to address the challenges facing the health system, i.e., access to care, quality of care, equity in health funding and increased spending.

Patient-based funding is a resource-allocation method linking the patients, the care provided, and the costs incurred by providing that care. It considers the type of care provided and volume, which differentiates patient-based funding from traditional approaches where resources are allocated on historical budgets and organisational envelopes, thus introducing more transparency and equity.

As a stepping stone, the Ministry of Health undertook the implementation of patient level costing across 31 healthcare organisations of the province. This was done for each health network, allowing for costs to be organised across the whole continuum of care: hospital, community service, rehabilitation, long term care, etc.

The presentation will cover the mains phases of this 3 years project, the key outcomes, as well as the overall approach and strategy.

Specially, far from being a pure financial initiative, the case costing implementation include a wide variety of clinical data, creating a rich source of information about quality of care and patient outcome. Resulting information is used to understand patient's clinical outcomes, supports implementation of integrated practice units and provides medical leadership with the tools and metrics to support best practices in care variability, laying the foundation to Value based healthcare.

Results
Financial and clinical data standardization are fundamental elements in Patient Level Costing, to ensure that the results are fully comparable across establishments.

The agile mode where certain elements are decided during the project represents a challenge

to manage the sometimes-changing expectations of the customer and ensure that the deliverables remain within scope. Joint planning, active risk management, focus on results, commitment to succeed and fast decision making have shaped the delivery.

Local and provincial costing results databases covering 8 financial years and now supporting the elaboration of the new funding models, analytical tools and the provincial benchmarking Portal.

Beyond the patient level data required for costing, the possibility of integrating descriptive patient level data into the model (incidents, accidents, complications, infections, comorbidities, diseases acquired during hospitalization, PREM, PROM, etc.) objective the impact of the quality elements of practices in terms of costs.

These elements complement the analysis of care trajectories and allow clinicians to become aware of the financial impacts of their practice.

Conclusions
This presentation wants to demonstrate that, case costing implementation, when incorporating a wide variety of clinical sources, exceeding those required for strict costing, provides a wealth of information about quality of care and patient outcome that can inform rates elaboration and support better decision making.

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Development of a Paying for Quality (P4Q) Approach for Schizophrenia Care in Ontario, Canada

Imtiaz Daniel [a], Fiona Fu [b], Philip Klassen [c]

Background
In Ontario, inpatient schizophrenia care accounts for 41% of the inpatient mental health activity in 54 acute and 4 specialized mental health hospitals with total expenses of approximately $700M annually. In the absence of a patient classification system for inpatient mental health, policy makers would like to explore payment mechanisms which will incentivize the adoption of best practices leading to better patient outcomes.

This initiative investigates a new paying-for-quality approach to incentive quality improvement using schizophrenia quality standards developed by provincial expert advisors. Ontario has 11 quality statements for care for adults aged 18 years and older with a primary diagnosis of schizophrenia who are seen in an emergency department or admitted to an inpatient setting. In addition, there are 15 quality statements that address care provided in the community for adults aged 18 years and older with a primary diagnosis of schizophrenia. The proposed funding model allocates funding based on measured performance according to best practices established in the quality statements. The initial phase includes all Ontario hospitals with inpatient mental health services. The second phase expands into the community setting

using four integrated care networks prototypes of hospitals and community mental health providers.

Approach
Schizophrenia quality statements and performance indicators to be used for the funding approach were selected using a modified-Delphi technique with a provincial panel of expert clinicians, healthcare administrators and academics advisors. The specifications and data collection for measuring concordance to the quality statements were developed and implanted using Ontario's established data system (the Ontario Mental Health Reporting System - OMHRS) used to collect inpatient mental health patient activity in all Ontario hospitals. Initially the Ontario Hospital Association developed and administered a survey to collect baseline data for 2019/20 and the data elements were refined and translated into the OMHRS tool and hospitals were mandated to send data elements to the Canadian Institute for Health Information beginning April 1st, 2021/22.

Using payment for results and behavioural economics principles to incentive quality processes, the approach allocates a proposed quality funding envelope to a hospital based on a hospital's relative performance to benchmarks and annual improvement. The benchmarks and thresholds were established by the expert panel with a strong emphasis on the targets were realistic and achievable.

For the second phase in the community, a similar approach was undertaken. However, two expert panels were used: partners with lived experience and clinical/administrative advisors. The technical specifications and data systems were developed for all metrics. Only four integrated networks are collecting this information as a prototype for large scale implementation in the future.

Results
Four quality statements were selected from the Ontario Quality Standard for Adults with Schizophrenia Care in Hospital and four indicators were measured. In FY2021/22, there were 9,087 schizophrenia patients in 58 hospitals. In Q1 and Q2 of 2022-2023, the performance for following indicators were measured: Care Plan made available within 7 days (78.6%, 85.3%); Treatment received with long-acting injectable antipsychotic medication (52.2%, 58.3%); and Treatment received with Clozapine (40.0%, 50.5%).Follow-up by a physician within 7 days after hospitalization will be calculated after availability of Q3 data (currently reported to be 28.3% in FY2021/22). Most hospitals improved performance from Q1 to Q2 reporting. These improvements may be due to improvement in care as well as data reporting. The inter-quartile ranges for each indicator were large with many outliers at Q1 but were reduced in Q2.

Conclusion
The implementation of P4Q schemes began internationally in the late 1990s. Researchers identified primary care schemes incentivized mostly process and structural quality with emphasis on prevention and chronic care while P4Q schemes in hospital care incentivized improvement in health outcomes and patient safety. Studies have shown the size of the financial incentives could vary from 0.5% to 10% of the total provider income in hospital care. This Ontario investigation of P4Q proposed 0.5% as an initial funding amount.

The early results of this made in Ontario approach for mental health demonstrate effectiveness of adoption and measuring concordance to the quality statements. Organizations

began gaining insights from these measures for quality improvement and began collaboration with their peers across the province. This innovation will accelerate standardized mental health and addictions services and will provide accountability to investments in these sectors. When fully implemented, this proposed Ontario P4Q scheme can be used with provincial quality improvement initiatives of public reporting and audit and feedback to be a cost effectiveness strategy for schizophrenia care.

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[c] Ontario Shore Center for Mental Health Sciences, Canada

Bundled payments - What makes them work? Lessons from the US

Sarah E Neville [a]

Introduction
What makes bundled payment models work? Although this is a question that has been posed before, it is becoming more pertinent to understand as value-based health care gains traction in Australia and continues to be rolled out in the US. For the US, as value-based health care continues to be the preferred model for payment, an understanding of the factors that determine the success (or failure) of bundled payment models has big implications for effective design, implementation and monitoring in the future. For Australia, an understanding of bundled payment models in the US and what determines their effectiveness can inform a more system-wide move from volume to value.

Australia has made some incremental steps towards implementation of value-based payment models, including the introduction of safety and quality measures into the national activity-based funding arrangements[1]. However, large scale adoption of value-based payment models in Australia has been hindered by the siloed nature of primary, community and hospital care that inhibits the integration of both care delivery and funding for these services. The most recent National Health Reform Agreement on public hospital funding and health reform[2] places Australia at the precipice of change, with long term system wide reforms foreshadowed including paying for value and outcomes and joint planning and funding at a local level. Bundled payment models are an excellent contender for contributing to these national reforms if implementation issues can be overcome. Australia can potentially learn a lot from the large-scale implementation of bundled payments in the US.

Methods
Combination of desktop/literature review and informal interviews with policy-makers, academics and private sector experts including Dr Matthew Press, Dr Eric Hume, Dr Patrick Conway and Lynn Garbee.

Results
There are three major learnings to be gained from looking back at large-scale implementation of bundled payment programs in the US, in order to move forward in designing effective new programs.

1. Make participation in bundled payment programs mandatory;
2. Consider moving the trigger for medical condition bundles upstream into primary or specialist care; and
3. Be clear and transparent about bundle definitions, risk adjustment and prices.

Discussion
The US has led the world in large scale implementation of bundled payment programs for the past ten years. Programs like Bundled Payments for Care Improvement and Bundled Payments for Care Improvement (Advanced) were ambitious in both the scope of conditions covered and the amount of health expenditure impacted. If policy makers, payers and providers can take stock of the important lessons outlined here, namely mandatory participation, upstream triggers for medical conditions and price transparency, the next generation of value-based payment reform in Australia has the potential to benefit greatly.

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[a] Independent Health and Aged Care Pricing Authority, Australia

Leveraging Business Intelligence Tools for Precision Cost Analysis and Integrated Data Insights for Better Treatments in Slovenian Public Hospitals

Peter Benedik [a], Marjana Pikec [a], Mojca Cvirn [a]

Can a BI solution make wonders?
Digital transformation is shaping the landscape of institutional healthcare, offering numerous benefits to the healthcare industry, healthcare delivery, and advancements in treatments and therapies. However, alongside these improvements come challenges related to the quality control of extensive data collection, IT infrastructure, cost efficiency, innovative medical education principles, and new models in healthcare management. This transformation extends beyond businesses and services, ultimately influencing relationships between key stakeholders: healthcare providers, payers, and patients.

The increasing costs of patient care are placing considerable strain on the healthcare system, exacerbated by inflation, rising wages, and additional expenses. Shortages in healthcare

workers and outdated funding methods further complicate the situation, necessitating the adoption of new approaches like value-based healthcare, where hospitals receive funding based on patient outcomes.

In Slovenia, despite over 30 years of healthcare data collection, cost management in hospitals remains a challenge. While tools like Business Intelligence (BI) and Artificial Intelligence (AI) exist to aid analysis in administrative, business, and clinical areas, there is a gap in their effective utilization.

Drawing on our experience in the Slovenian healthcare ecosystem and extensive understanding of funding trends and internal clinical processes, we advocate for leveraging current BI tools to:

1. Systematically track and analyze costs for each patient, including medications, lab tests, and other expenses, moving away from fixed rates
2. Monitor overhead costs such as salaries, travel, and electricity more diligently.
3. Exploit integrated data from different systems to enhance analytical capabilities and support informed decisions, as well as identify areas to implement evidence-based practices; managerial and clinical.
4. Enable the measurement and tracking of clinical outcomes over time to assess the effectiveness of treatments and interventions, identify areas with suboptimal outcomes, and implement targeted improvements.
5. Advanced analysis of clinical pathways and workflows, identifying bottlenecks or areas for improvement. Optimizing clinical pathways contributes to streamlined processes, reduced delays, and ultimately better clinical outcomes.

The use of BI tools transcends mere digitization; it involves a fundamental shift in healthcare management practices. Over 30 years of experience in digital healthcare transformation emphasizes the crucial role of cooperation. and open communication between healthcare institutions and IT providers for success. The primary goal is to create value and improve patient treatments.

However, challenges persist, including limited awareness of specific monitoring parameters, a lack of understanding of hospital management principles, resistance to changing established processes, and the necessity for learning new routines. Additionally, there is limited knowledge of the complex healthcare financing system and challenges associated with the diverse array of available analytical tools, leading to operational inefficiencies.

In essence, BI empowers healthcare professionals with tools to transform raw data into actionable insights, fostering a data-driven culture that positively influences clinical decision-making and, consequently, enhances patient outcomes. While BI solutions and tools, along with available medical data, exist, a critical consideration of how to effectively use this data to address the aforementioned challenges is lacking. The presented use case will illustrate how maximizing the benefits of BI tools through open dialogue between medical professionals and IT providers can contribute to advancing the overall healthcare system.

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ATIH study on drugs : a new way to regulate

Ines Bozinovic [a], Diane Paillet [a], Sophie Guéant [a], Joëlle Dubois [a]

Introduction
Each year since 2015, the French technical agency for information on hospital care (ATIH) leads a study on the use of drugs in hospitals. Hospitals send data including the amount of dispensed units and the money it represents. In 2023, 1 502 hospitals sent data. ATIH developed a platform to compare clinical practice between hospitals, region or nationally. Each hospital has access to its data and can see if its use is closed to the one usually found in the equivalent hospital. We present the results of a comparison between the region of Provence Alpes cote d'Azur and Rhone Alpes.

Methods
Hospitals are asked to send their data on an internet platform each year. They send the quantity of dispensed units, the cost it represents and if there is outpatient delivery. Data have been collected since 2015. In 2022, it represents 75 % of French hospital activity in days. Data collected from 2019 to 2022 were checked and imported on a shiny platform with restricted access.

Results
A new website is available for use. It includes hit list for all hospitals or for specific ones as acute care, rehabilitation care, home hospitalization and psychiatry. We can see that consumption are different according to the sort of hospital. For psychiatric hospitals, nervous system drugs are mainly found out. We can also make a hit regarding sums in ATC classification. Anticancer drugs are at the top of this list for acute care and rehabilitation hospitals.

For INFLIXIMAB, Auvergne Rhone Alpes use 89.7% of biosimilar : 89 174 units representing 6 312 852 € and PACA use 78.9% of biosimilar for 44 211 units representing 3 233 659 €.

Discussion
Public health services and hospitals can have access to this platform. They can compare regions as hospitals. This can help in regulating antibiotics use or biosimilar switch. It is also interesting to have a look at drugs prices, regional grouping will be able to compare the costs to optimize their procurement.

[a] French Technical Agency for Information on Hospital Care (ATIH), France

Thursday Late Afternoon

Population health and integrated care (1)

Person-centered and integrated care for patients with complex needs - a Norwegian case on how to move from concept to new evidence based health care services

Bendik Hegna [a], Olav Lenvik [a], Eivind Dalgaard [a]

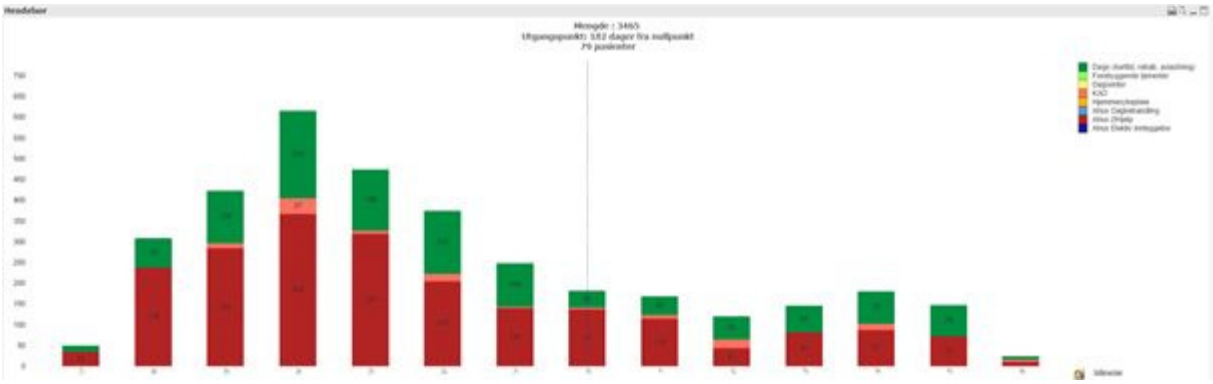
Introduction
Demographic change is believed to result in an increase in the number of older, frail, and complex patients. This will place a significant burden on healthcare systems, necessitating a shift towards more preventive, user-driven, and coherent care approaches. Recognizing the challenges faced by frail elderly individuals with complex long-term needs, particularly those dealing with multiple care providers and susceptible to care fragmentation, we aimed to design a novel healthcare intervention. This patient group constitutes a substantial portion of the 5-10% top spenders, contributing to two-thirds of high-level healthcare spending both in Norway and internationally.

In collaboration with five municipalities, general practitioners and our hospital, Akershus University Hospital, we developed the Integrated Health Care (IHC) program. The IHC-program focuses on the use of individualized care plans, emphasizing extensive collaboration to provide optimal service and quality treatment. The aim is to provide the patient with the best possible service and quality treatment, regardless of which involved provider has to perform the activities. As a part of the model we developed a set of tools to identify new IHC-patients, control process flows and measure results of the intervention.

Methods
In patient-centred and integrated care models, it is necessary to combine data from different sources to achieve a complete view of the intervention. The IHC-team developed several new applications because there was no existing integration between the hospital, general practitioners and the municipalities' data systems that could be utilized to accomplish our common objectives. We created:

- an application to identify new patients we wanted to include in the IHC program, using daily updated data from the hospital's EPJ.
- an application to alert involved care providers when certain activities occurred, enhancing collaboration efficiency across providers.
- an application to follow each patient's clinical pathway, allowing us to plan and assess the clinical process .
- an application to monitor results and track each patient's progress based on data from both the hospital, general practitioners and municipalities, allowing us to assess the effectiveness of the IHC program.

Results
We conducted an analysis of the use of healthcare services for 79 IHC-patients six months before and after the inclusion. We observed a significant decrease in acute hospital admissions, use of municipal emergency stays and institutional care stays. Additionally, the total cost for these patients was lower during the same period after they entered the IHC program. These findings indicate that this approach not only reduces costs but also improves the quality of patient treatment.



Discussion
Shifting towards patient-centred and integrated care models, opposed to isolated care provided by individual providers, appears to reduce total costs and improve the quality of treatment. However, due to poor integration between the data systems of different providers and GDPR-regulations, accomplishing this on a larger scale is challenging. Overcoming the hurdles related to sharing data among all involved parties remains difficult, and we are now working with the Norwegian health directorate and regional health authorities to make this possible.

[a] Akershus University Hospital, Norway

The Added Value of Using Primary Care Data in Population Health Management

James Barrett [a], Paul Molyneux [a], Stephen Sutch [b]

Introduction
Population Health Management (PHM) is a key data driven methodology aimed at improving the health of the whole population. PHM techniques include population profiling to understand health needs, followed by targeted interventions to improve the physical and mental health of specific segments of the population. This can include allocating scarce resources based on measured need. In many countries the most easily available national datasets come from secondary care (Hospital). However, there are limitations with the coverage and completeness of secondary care datasets which may impact their suitability for use in PHM. In this paper we will assess the suitability of secondary care datasets for PHM and look at the added value a rich primary care dataset can bring to PHM.

Methods
A study was made of the differences in disease prevalence for the same UK population when they are based on primary care data only compared with secondary care data only. From this we were able to establish the extent of morbidity information that is present in one data set and not in the other. The impact of these differences on typical PHM analyses was also assessed.

Results
Results will be shared showing some of the differences in the comprehensiveness, completeness and richness of datasets that do and do not include full primary care data. Significant morbidity such as angina, eczema and depression are often not present in the secondary care record as they can be managed in primary care. A large proportion of the population were found to have primary care data but no secondary care data. Examples of analyses relevant to PHM that benefit from using the full

primary care data set will be shown, including some real-world case studies utilising such an integrated care data set.

Discussion
In general, secondary care data is more available than primary care data and many PHM projects are based on secondary care data alone. In this study we have shown that the increased coverage and completeness seen in primary care data allows a range of PHM analyses that would not be possible with just secondary care data. PHM analysts need to be aware of the limitations of the data set when drawing conclusions based on secondary care data only.

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[b] Johns Hopkins University, United States

Developing risk-adjusted primary care capitation payments in Ontario, Canada using the CIHI population grouper.

Lyn Sibley [a], Yin Li [a], Yvonne Rosehart [b], Debra Chen [b], Rick Glazier [c], Jasmin Kantarevic [a]

Introduction
In 2022 an agreement was reached, between the Ontario Ministry of Health and the Ontario Medical Association, to incorporate a risk-adjustment factor into the capitation payments for Family Health Organizations (FHOs), that uses the Canadian Institute for Health Information (CIHI) population grouping methodology. FHOs are the most common primary care physician payment model in Ontario. This group care model reimburses physicians via a combination of capitation payments, fee-for-service fees, and incentive premiums. The current capitation payments are based solely on the age and sex of the patients on their roster. The CIHI population grouper uses person level diagnostic information available in administrative data to classify people based on their morbidity level and health conditions, to facilitate prediction of their expected resource use and other outcomes. A significant implementation challenge is that due to a delay in the availability of data diagnostic information from the immediately previous year is not available at the start of a fiscal year and therefore risk adjustment measures must be based on data from two years prior to the payment year. This research evaluates the use of the CIHI grouper for risk adjusting FHO capitation payments.

Methods
The primary care physician service utilization of all residents of Ontario in fiscal year 2022/23 (April 1, 2022 to March 31, 2023) was modelled on their age and sex; and on their age, sex, and health conditions as identified by the CIHI population grouper in 2020/21 and in 2021/22. Based on this model each person was assigned to one of five Primary Care Utilization Bands (PCUB) which indicated their predicted level of primary care resource use. Next, the total primary care utilization of the patients on each physician's roster in fiscal year 2022/23 was modelled on the distribution of patients by age and sex; and age, sex and PCUB.

Results
The population model that included CIHI population grouper variables had an R^2 of 10%, compared to 0.2% based on age and sex alone. This was 1% less than the models based on CIHI grouper variables from one year immediately prior to the outcome variable. At the physician roster level, 77% of the variation in utilization was explained by age, sex, and 2020/21 PCUBs while 55% was explained by age and sex alone (the current approach). This was 3% less than the model using 2021/22 PCUBs.

Discussion

Adjusting FHO capitation payments using the CIHI population grouper would bring remuneration levels more aligned with the expected primary care utilization of rostered patients. Besides resulting in more equitable physician compensation, this would also provide more of an incentive for physicians to enrol higher needs patients. There is minimal impact of using morbidity measures from two years prior compared to one year prior to the payment year.

[a] Ontario Medical Association, Canada
[b] Canadian Institute for Health Information, Canada
[c] Institute for Clinical Evaluative Sciences, Canada

Casemix and clinical coding (2)

Reviewing Activity Based Funding outcomes at the time of coding

Judy Finn [a]

Introduction
The coding tool used by coders across most hospitals in Australia provides coding, DRG assignment, coding edits and calculation of estimated reimbursementfor episodes of acute care in public hospitals. Hence the coder is reviewing the DRG assignment and funding outcome as they code.Estimated reimbursement is based on calculation of National Weight Activity Units (NWAU) and the results are sometimes unexpected.

Methods
Summary of coders' steps at time of code assignment, excluding Clinical Documentation Improvement activities:

- Assign codes
- Resolve edits
- Reconcile DRG assignment
- Evaluate estimated reimbursement - Sometimes performed retrospectively during so called optimisation auditing
- Evaluate HAC assignment
- Verify unexpected reimbursement using calculator
- Seek validation as required

Results
The vast majority of episodes coded result in "expected" reimbursement outcomes. These are the common causes of unexpected NWAU results reported:

- Missing data example: Newborn episode: If the number of qualified days is missing, the NWAU value calculated will be zero because theQualified days is used as length of stay for newborns. Qualified days is also used in identifying hospital acquired complications.

  DRG P68B inlier weight = 1.3656 where qualified days = 1-11 days
  If baby develops a heel pressure injury that's a hospital acquired complication which attracts a funding reduction.
- Incorrectly mapped data: Incorrectly mapped funding source data. The hospital system for patient admitted data often uses differentvalues for data. These values are mapped for the purpose of sending to Codefinder, and often for the national data collection.Values are mapped to national values used for NWAU.
- Not understanding the NWAU calculation:
-

  1. Private patient with Hospital Acquired Complication (HAC). The NWAU can be zero due to the funding reductions applied forHACs and private patients.

     Sample calculation showing simplified formula:

```
NWAU = weight – (1– private patient service adjustment) – (LOS x private pt
accommodation adjustment) – weight x HAC adjustment rate
NWAU = .3333 – (1–.0603) – (5 x .3090) – .3333 x 1300
NWAU =0
```

2. Adding a diagnosis code can shift the DRG to a more complex DRG and this can result in less funding when the patienthas been in ICU because of the different boundary points for each DRG.

Consider ADRG E40 Respiratory System Disorders with ventilator support. The addition of code B370 Stomatitis changes the DRG from E40B to E40A.Being more complex it might be reasonable to expect that the NWAU, and therefore the reimbursement might be greater.

Not always. The more complex DRG E40A has a lower boundary of 2 days. Because ICU hours are funded with an adjustment, the ICU hours are subtractedfrom the LOS for the calculation, hence the LOS in this example becomes 1 because there were 280 ICU hours.

Discussion

- Visibility of the estimated NWAU at the time of coding leads to inevitable questions when the result is unexpected
- Scrutiny of the NWAU contributes to data integrity and ensures the hospital receives the funding they are entitled to
- Most often NWAU is not wrong; it's unexpected

[a] 3M Health Information Systems, Australia

Sleeping Beauty Awakens: Rewarding Coders in the New DRG Era - Ever Since the Phoenicians, Gratitude Has Currency:

Jana Wahl [a], Marko Jug [b], Robert Senica [b], Tatjana Pavlin [b], Vesna Mesojednik [b], Anna Coote [c]

Introduction
Remember Sleeping Beauty, awakened by a prince's kiss?

Imagine that the new DRG system is our Sleeping Beauty, slumbering in potential.

With the right incentives in place, we can awaken it to its full power! Years ago, Don Hindle used to talk about the diffuse brain in the health care system that needed to be harnessed in order to make the projects work.

Inspired by a timeless truth - "Since the Phoenicians invented money, there is only one way to express gratitude" (Portuguese proverb) - this paper proposes a bold approach: reward coders for accurate and efficient work.

Background
DRG coding in a large university hospital with more than 100,000 admissions per year is a challenging task. The University Clinical Centre of Ljubljana has been involved in DRG implementation since 2004. As there were no formal training programs for DRG coders at the time of inception, Slovenia has developed a modified clinical coder model that includes clinicians as the persons responsible for the accuracy of the coding information, as well as nurses as facilitators and other members of the staff. We have always promoted the diversity of professional cultures as a catalyst for the implementation of change in the hospital. In 2023, with the introduction of a new

version of the DRG 10 grouper system, version 10 (a leap from version 4), the hospital was catching up, but was still faced with chronic challenges such as under-coding and knowledge gaps. It seemed that the traditional approaches were not going to be enough.

Solution
With the current availability of online coding training programs such as eHealth Education's Diploma of Clinical Coding eHrol, we created a group of coders that included approximately one third of physicians with some previous coding experience, some complete beginners, and the remainder of staff with various non-medical backgrounds who had been involved in the coding and billing process for years. As the people selected were fully committed to their work, we proposed a novel solution: a reward system that recognizes the coders' crucial role, as well as the allocation of part of their time as dedicated to the program, partly working from home. This, like the prince's kiss, is a source of motivation and commitment.

In addition, 6 members of the coder group are also active in a separate group that has been set up with the intention of continuing data analysis and improvement and benchmarking. It is interesting to note that the bottom line benefits of both groups at this point in time greatly exceed the investment in training and rewards.

Methodology
This paper is a preliminary report based on insights from leadership and successful coder training initiatives. We analyze the impact of reward systems in similar contexts and propose a framework specifically designed for the DRG environment.

Expected outcomes:
By empowering coders, we are envisioning Increased coding accuracy and efficiency, Improved adoption of the new system, Improved coder morale and motivation, Optimized financial performance for the hospital and desired outcomes for the country as a whole.

Significance
This paper offers a fresh perspective on how to address the challenges of recruiting, training, acknowledging and rewarding of DRG coders, where recommendations can be beneficial to different DRG environments. It goes beyond traditional compliance-driven approaches and promotes a culture of value and incentives. In essence, it unlocks the true potential of the system to benefit coders, facilities and ultimately patients.

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[b] University Medical Center Ljubljana, Slovenia, Slovenia
[c] eHealthEducation, Australia, Australia

Data Quality Education Sessions for Coding Staff, what's happening out there?

Jacqui Curley [a], Helen Nolan [b]

Introduction
The Hospital In-Patient Enquiry (HIPE) collects activity data on admitted patients in public hospitals in Ireland. HIPE staff work hard to collect data for over 1.7million discharges annually and in order to link the daily operational work into where and how the data is used, and the importance of data quality, the HPO has provided quarterly HIPE data quality sessions for all HIPE staff.

The Healthcare Pricing Office (HPO) manages this data set including the provision of training for HIPE coders and also has data quality and audit functions. There are approximately 320 HIPE staff nationally including HIPE coders and Managers and team structures vary from hospital to hospital.

Methods
The HPO have delivered scheduled quarterly HIPE data quality session online since 2013 and prior to that data quality education sessions were held approximately twice a year. These 2 hour quarterly sessions give feedback to HIPE staff on how the data they collect is being used at a national level, the importance of high quality data and information on all areas of data quality.

For example, in 2023 topics covered in the HIPE data quality sessions included:

- Classification updates
- Endoscopy diagnostic coding
- Neonatal sepsis/risk of sepsis
- Overview chart based audits 2022
- Coding of Tobacco Use Disorders
- Augmentation of labour
- COPD/Asthma/Bronchitis
- STEMI and NonSTEMI review
- Clinical documentation

The sessions also include forthcoming changes to variables, data quality tools, general updates on how HIPE data is being used across the health service.

Issues identified during other data quality activities can be raised or areas where coders are raising queries and additional specific training is required e.g. post procedural complications, diabetes.

The sessions also provide an opportunity to train HIPE staff in the use of HPO data quality tools for example audit software, Checker tool and any updates or changes to the PICQ system (a commercial data quality tool) which is in place in all hospitals.

At times of an update to the classification the data quality sessions give a platform to look into particular areas in more depth or address queries and questions from coders on the update.

Additional data quality sessions can be scheduled for specific topics - for example a session was held on the assignment of the hospital acquired diagnoses flag.

Results
There has been consistently strong uptake for these sessions and the material is shared with attendees for discussion and sharing of the content amongst the teams.

The numbers attending the sessions are shown below for the last 5 years:

Year	No. of Sessions	No. of Participants
2023	3	175
2022	4	177
2021	3	178
2020	4	196
2019	4	160

During COVID these sessions were particularly useful for staying connected to the coding community and letting them know how important their work is.

Conclusions

The data quality sessions have provided a useful platform to keep the coding community informed of the wider applications of HIPE data which they may not otherwise be aware of. Feedback and engagement on data quality matters helps to share learning and close the audit cycle. HIPE staff are informed as to what is happening out there with the data they collect.

[a] Head of HIPE & NPRS, Healthcare Pricing Office, Ireland, Ireland
[b] Interim Head of HIPE Coding, Healthcare Pricing Office, Ireland, Ireland

Classification development (1)

Australia's journey towards ICD-11

Anne Elsworthy [a]

Introduction
The International Statistical Classification of Diseases and Related Health Problems, Eleventh Revision (ICD-11) is the international standard for reporting diseases and health conditions. It reflects the latest advances in science and medicine in a completely electronic format.

Despite its advantages it is a daunting undertaking to replace a highly utilised and embedded classification such as the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM) with ICD-11. Especially as taking advantage of modern digital capabilities means that ICD-11 has been completely restructured.

Despite these challenges the Independent Health and Aged Care Pricing Authority (IHACPA) recognises its advantages and is committed to the ICD-11 journey.

Background
IHACPA is responsible for the development of ICD-10-AM which captures admitted patient clinical activity and underpins casemix classifications such as the Australian Refined Diagnosis Related Groups (AR-DRGs).

These classifications are also licensed internationally.

Will Australia keep developing and modifying ICD-10?
The answer is, yes, but likely only in the short term while IHACPA and other stakeholders in Australia conduct work to assess ICD-11 and establish its fitness to replace ICD-10-AM.

Preparing for a future implementation of ICD-11

Limiting updates to ICD-10-AM
In recent editions of ICD-10-AM major updates have been aligned with ICD-11 where possible, and major refinements limited given ICD-10 is no longer being updated.

Implementing cluster coding
IHACPA considers that cluster coding has immediate and longer-term benefits that include aiding a transition to ICD-11, where cluster coding is a feature.

Cluster coding is a mechanism of linking related diagnosis codes through use of a diagnosis cluster identifier to enhance the value of coded data.

IHACPA is planning to implement cluster coding for ICD-10-AM Thirteenth Edition.

Mapping ICD-10-AM to ICD-11
In 2023 IHACPA commenced a project to map ICD-10-AM to ICD-11, with the goal to identify the gaps and new features of ICD-11.

This will provide a consistent foundation to compare the benefits and assess the impact of ICD-11 on morbidity reporting and other classifications. IHACPA considers this to be the most important step to inform a potential decision on whether ICD-11 is fit to replace ICD-10-AM.

Following completion of the mapping IHACPA will generate proposals for the ICD-11 platform to address identified gaps and commence work to ensure that ICD-10-AM indexed concepts are considered and the extension codes and Reference Guide are suitable.

Other ICD-11 considerations
IHACPA has bespoke software known as the 'ICD Toolkit' that generates ICD-10-AM outputs such as the electronic code lists and mapping tables.

Replacement of the 'ICD Toolkit' will commence in 2024 to minimise current manual processes that produce classification outputs and will also consider functionality to support ICD-11.

IHACPA is also planning a project to consult, develop and conduct a cost benefit analysis for a potential ICD-11 implementation.

Conclusions
The work to replace a highly utilised and embedded classification such as ICD-10-AM is not insignificant and will take time, however, the opportunities that ICD-11 present are exciting and IHACPA is committed to the ICD-11 journey.

[a] Independent Health and Aged Care Pricing Authority, Australia

French ICD-10 to ICD-11 transition impact study and implementation project

Ines Bozinovic [a], Sophie Guéant [a], Yasmine Mokaddem [a], Etienne Joubert [a], Joëlle Dubois [a]

Introduction
At present, medical data collection in French hospitals is based on the 10th version of the International Classification of Diseases (ICD) for the coding of medical diagnoses, according to instructions and standards issued by the Technical Agency for Information on Hospital Care (ATIH). The 11th version of the International Classification of Diseases (ICD-11), officially adopted by the WHO in 2019, replaces the ICD-10, which will no longer be updated. As the state of the art in medical nomenclature, ICD-11 represents an upgraded version which contains new chapters and new concepts, like the "post-coordination" and the "extension codes". By 2023, 64 countries (out of 194 WHO member states) had initiated ICD-11 deployment. At the national level, ICD-11 deployment is led by the French WHO Collaborating Centre - CC-OMS, coordinated by the Digital Health Agency (ANS).

ATIH, as part of the CC-OMS, is responsible for the morbidity use case. To have a better scope of the ICD-11 implementation project and build a road map, ATIH carried out an impact study of the transition from the French ICD-10 to ICD-11.

Methods
The impact study was based on a total of 22 interviews, conducted with hospital representatives, institutional players, and software editors. Interviews were also conducted with the project leaders of the ICD-11 transition in 5 European countries: Denmark, Sweden, Norway, Germany, and the United Kingdom.

Results
Thanks to those interviews, a SWOT analysis of the transition from the French ICD-10 to ICD-11 was produced and was further completed by an international comparative study. Based on this impact study, we identified the necessity to discuss further the level of integration of this new classification to the current French classification of diseases, and the different digital tools that were going to be needed for a successful implementation, such as automated coding. All in all, as the different European project leaders pointed out, the deployment of ICD-11 in France will necessarily take place over a long period and will rely on good coordination with all the stakeholders involved in this transition project.

Discussion
The discussions based on the conclusions of this impact study will allow the definition of a global strategy for the implementation of the ICD-11 in France, the selection of priority milestones, and finally the definition of the project roadmap by 2026.

[a] French Technical Agency for Information on Hospital Care (ATIH), France

Towards a ICD11 SNOMED CT common use for Morbidity and Casemix

Béatrice Trombert [a], Constant Kone [b], Jean Marie Rodrigues [c]

This submission is an extract of a PhD dissertation of a co -author. The idea came from the WHO SNOMED CT common work to try to create a common ontology between the 11th version of WHO International Classification of Diseases and Health Problems (ICD) and the most used in the world clinical terminology named Systematized Nomenclature of Human and Veterinary Medicine - Clinical Terms (SCT).

The work aims to develop a SNOMED like ontology for ICD11 chapter 1 using on one hand the textual definitions of ICD11 codes which is a completely new character of ICD and on the other hand the ontology tools provided by SCT in the publicly available SNOMED browser.

The first step lexical analyzed if the labels of ICD11 codes were lexically aligned with SCT codes fully specified or synonymous names.

The lexical stage showed that there is a complete lexical alignment between ICD-11 codes labels and SCT codes fully specified or synonymous names when the different levels of post-coordination between the 2 systems are taken into account.

What was the issue of the second step ontological was to know if this lexical match means the same thing for ICD11 textual definition and SCT concept model (ontology representation) for the lexically match labels of ICD11 and SCT.

For ICD11 it was necessary to decide if the textual definition characters was always present (alone without restriction) or not (can be, sometimes et.)

The SNOMED browser provides an Information Model and a Compositional Grammar which are practically applied and available on the browser for ONLY a subset of SCT codes (concepts in the SNOMED terminology) which are said Fully Specified by SNOMED editorial board.

When a SCT code is not fully defined to day officially by SNOMED the work has tried to give a fully ontology representation with attributes and values present in SCT browser BUT not validated as well as when some characters always present in the ICD11 textual definitions were not represented by SCT fully defined concept models.

The ontological stage showed a complete representation of ICD-11 textual definitions by SCT concept models of SCT codes attributes and values authorized OR not authorized.

The work has certain limitations:

- Some ICD-11 titles do not yet have a description. We have considered that the ICD-11 label took its place.
- This work focuses on only Chapter1 of ICD-11 and shall be tested on the whole ICD-11.
- We excluded from our work the ICD-11 codes "other" and "unspecified" which cannot have any formal logical meaning and needs queries for the common ontology ICD 11SCT.

As a conclusion

- The work measures the gap between a lexical alignment and a meaning alignment between different health terminologies.
- There is a need to extend the use of SNOMED attributes and values presently not authorized to align ICD11 and SCT
- The work opens a way to a Formal Ontology comparison between ICD-11 and SCT critical point before a joint development of a Common Ontology between ICD-11 and SNOMED CT

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National Casemix Developments

Casemix, readmissions and patient perspectives in Lebanon: impact of the national hospital pay-for-performance initiatives.

Jade Khalife [a]

Introduction
There has been mixed evidence on the impact of Pay-for-Performance (P4P) in healthcare, particularly for hospitals at scale. In 2014, the Lebanese Ministry of Public Health integrated a P4P model for determining hospital reimbursement tiers, including casemix and patient satisfaction, across about 140 hospitals. In 2018, this model was updated to include a readmissions component. The impact of these interventions was previously undetermined, and may present a useful contribution to some of the known knowledge gaps regarding hospital P4P, and more broadly value-based healthcare, particularly in limited resource settings.

Methods
We used a mixed methods approach, combining quantitative and qualitative study designs, to conduct four research investigations. The first study used a descriptive analysis to address how and why hospital P4P was developed in Lebanon. The second and third studies used an interrupted time series design on data collected from the national hospitalization database, with Newey-OLS regression and autoregressive integrated moving average models, respectively. P4P impact on casemix index (study two) and on readmissions (study 3) was assessed. The fourth study investigated patient perspectives, using qualitative content analysis of data collected eight focus groups discussions with patients.

Results
Hospital P4P was developed in Lebanon to due to stakeholders recognizing the limitations of the previous reimbursement model that had been solely based on accreditation status. Casemix index was included to improve the appropriateness and fairness of the relation between the Ministry and hospitals. The second study included 1,353,025 hospitalizations between 2011 and 2016. This revealed an abrupt increase in casemix among short-stay cases, and a gradual increase in medium-stay cases. Code-level analysis suggested this was attributable to a decrease in unnecessary hospitalizations and improved coding practices. The third study included 1,333,691 hospitalizations across 2011-2019. An abrupt decrease of cholecystectomy and stroke readmissions was found, but not of general and pneumonia readmissions. The qualitative study allowed us to identify six patient perspectives, including satisfaction, health status, perceptions on each of quality, access and health system, and valuing of health, all of central relevance to health systems performance.

Discussion
Hospital P4P in Lebanon led to several positive impacts, including improving the relation between hospitals and the Ministry of Public Health, and providing a tool for continuous development of the health system. The 2014 and 2018 P4P interventions improved system effectiveness and related patient outcomes, by decreasing unnecessary hospitalizations and decreasing some types of readmissions. The P4P model should be further developed to capture the entire spectrum of hospital visits. A useful approach for evaluating health system interventions involves applying appropriate interrupted time series analysis on readily available data. In Lebanon, patients valued health highly and supported improving public hospitals, and decreasing the influence of personal connections and

money. People and patients can be more widely engaged by their health systems, and they should have the central role in shaping the values and functions of a health system.

[a] Lund University, Denmark

Casemix Revolution: Maximizing Healthcare Value through National Initiatives

Manal Al Khaliefah [a], Hefin Jones [a], Neha Taneja [a], Abdulrahman Alshehri [a], Suliman Alomran [a], Saud Alhamami [a], Ehab Atassi [a]

Introduction
As the Kingdom of Saudi Arabia moves towards achieving its vision 2030 objectives, it calls for massive transformation in the public healthcare sector. This transformation in (KSA) requires that Ministry of Health to move towards value-based care including adopting payment mechanisms that support value-based financing. Therefore, it was acknowledged that there is a need for an entity that facilitates the transformation through implementing innovative solutions to drive transparency, efficiency, and value-based financing. The National Casemix Centre of Excellence (NCCoE) and its key functions are leading several key initiatives to realize the vision objectives. This session gives an overview of collective national initiatives that reflects end-to-end implementation of Casemix concept starting with coding and coding related activities, classification, costing, pricing, efficiency of care, and funding mechanism.

Methods
NCCoE has acknowledged the gaps and pressing needs in the healthcare system and responded to them with multiple initiatives to be conducted on the national level. These initiatives will be the catalyst of healthcare delivery reform. Designing these initiatives was done according to the international best practice, but also, they were customized to fit the local context considering the unique challenges the system is facing.

Results
The Saudi government has an ambitious strategy to its overhaul healthcare system. Therefore, NCCoE is instrumental in driving the ongoing changes. Its initiatives are directly fuelling national endeavours, particularly through the policy department's influence on healthcare practices. Therefore, NCCoE has led several national initiatives that falls within its scope and covering different domains. this includes standardizing coding and coding related operations, development of non-acute Casemix classification, development of costing assurance framework and, costing standards, actuarial governance and national pricing framework, national efficiency targets and national payment strategy. The success of these initiatives paved the way for value-based healthcare implementation. These initiatives are profoundly reshaping the landscape of the Saudi healthcare system and impacting its overall ecosystem.

Conclusions
NCCoE is fulfilling its mission in accelerating the transformation by addressing the gaps in the system following the best practices globally, but also customizing these practices according to the country needs. These customizations involve overcoming systemic challenges such as lack of proper infrastructures and system fragmentation. The centre undertook various initiatives across its core functions, aiming to achieve financial sustainability of health system.

[a] Casemix Center of Excellence, Saudi Arabia

Addressing the Staff Shortage and Ensuring Patient Safety in German Hospitals: The Role of Data Acquisition and Analysis

Marion Preussiger [a], Isabel Huber [a], Thomas Cibis [a], Frank Heimig [a]

Introduction
The German DRG institute (InEK) was established in 2001 to implement a Diagnosis Related Groups-based per-case payment system. Since the end of the noughties an increased reduction in nursing staff had been recognised. Accordingly, governmental funding programs have been established to create additional nursing jobs. Last but not least the COVID-19 pandemic has exacerbated the challenges of nursing staff shortages and high staff workloads and has underscored the critical importance of data collection to analyse the processes in hospitals.

Methods
As previous funding only targeted personnel recruitment, from 2018 on, the German government has taken steps to ensure the quality of patient care and to improve working conditions for nursing staff in hospitals.

InEK was commissioned to identify care-sensitive areas in hospitals and to define minimum nursing staff limits (MNSL) in the respective areas, including the creation of the necessary database. MNSL determine how many patients may be cared for by one nurse in the respective care-sensitive hospital area.

In addition, a new law stipulated the uncoupling of nursing staff remuneration from the G-DRGs in 2020 and financing via a cost recovery principle (care budget).

Results
According to the legal mandates, InEK collected data from hospitals on the number and qualification of nursing staff, the number of patients and the specialist departments occupied as well as structural data according to §21 Krankenhausentgeltgesetz. The MNSL were calculated on the basis of collected data from selected hospitals and brought into effect by the government. A nursing staff ratio was calculated in order to assess the number of nursing staff in relation to the nursing workload ensuring appropriate care and patient safety throughout the hospital. Hospitals are obliged to provide InEK with quarterly data on compliance with the requirements in the identified care-sensitive areas.

Data acquisition of the nursing staff cost data was also established as part of the care budget separation. Data were provided by the hospitals and health insurance companies.

By collecting and analysing data, InEK can contribute to answering the questions: How many nursing staff do we have in each hospital (MNSL)? What are the associated costs (care budget)? Is this data reliable (§21-data)?

The data not only provide information on the composition of staff (e.g. nursing staff, nursing assistants and academic nursing staff), but also on compliance with minimum standards in nursing care. The data collected also made it possible to determine the legally entitled recipients of special benefits in the context of the coronavirus pandemic ("COVID-19 bonus").

Discussion
The completeness, accuracy and connectivity of the data collected are fundamental aspects of InEK's work, as they directly impact the validity of the findings derived from the data and the effectiveness of measures taken to improve patient care.

While a paradigm shift in hospital planning through the hospital reform is under discussion and legislation, needs for additional data collection (e.g. midwifes, doctors as part of §21-data collection), as well as for alternative methods of recording the nursing workload using a suitable methodology for the assessment of staff needs (PPR2.0) are becoming increasingly evident.

Another goal of the government is to create transparency for patients in the German hospital landscape by implementing a new register, providing information on the quality, performance and staffing levels of hospitals. InEK's data acquisition can be the basis for this.

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Friday Morning

Population health and integrated care (2)

Exploring integration of pharmaceutical data into CIHI Population Grouping Methodology - a pilot study

Yvonne Rosehart [a], Debra Chen [a], Jing Jin [a]

Introduction
The Canadian Institute for Health Information (CIHI) population grouping methodology (CIHI POP Grouper) looks at the population over an extended period across multiple healthcare settings and assigns each person in the population a clinical profile that includes health conditions, Health Profile Group (HPG), cost weights, and predicted future use of select health services. In a recent study, CIHI explored the impact of including information from pharmaceutical data for a sub-population who received pharmaceutical care via publicly funded drug programs in the POP Grouper.

Methods
The data used in this study included clinical and cost data for inpatient, day surgery, emergency department and physician visits as well as clinical data for long-term care and home care services between fiscal years 2015/16 and 2016/17. The population of interest included individuals who received prescribed medications via publicly funded drug programs where clinical information was captured in the National Prescription Drug Utilization Information System (NPDUIS).

The pilot study adopted an existing drug-disease pairing methodology to map prescription drugs (as a proxy) to health conditions, and this information was then used to help confirm the diagnoses captured in primary health care data, as well as conduct descriptive analyses to assess the impact of including pharmaceutical data on building population clinical profiles.

Results
With the addition of pharmaceutical data, on average more health conditions and higher cost weights were assigned to a person's clinical profile. Inclusion of pharmaceutical data also moved a good proportion of the clients to a different or more severe health condition category.

Discussion
The pilot study showed that adding pharmaceutical data helps improve population clinical profiles by providing additional clinical information to complement the picture of an individual's health care resource requirements.

While the pharmaceutical data adds valuable information to population clinical profiles, limitations and challenges are also noted. For example, lack of comprehensive drug-disease pairing methodology, off-label use of prescription drugs, multi-purpose medications, and data coverage limitations. As more comprehensive methodology is developed and more pharmaceutical data becomes available to CIHI, the study will continue to be refined and explore if including pharmaceutical data helps to improve the performance of POP Grouper predictive models and further describe population's resource requirements.

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Improving planning for cross-sectoral health care provision using a needs-based population classification system (PopGrouper)

Chrissa Tsatsaronis [a], Karen Kinder [a], Wilm Quentin [a], Ulrike Nimptsch [a], Anika Kreutzberg [a], Reinhard Busse [a]

Introduction
In recent years, several high-level reports in Germany have recommended the re-orientation of planning of healthcare delivery structures in Germany towards an integrated needs-based approach including inpatient hospital care and ambulatory medical care, while incorporating population level morbidity metrics.

The newly developed PopGrouper is an instrument for determining morbidity, which can be used to measure (cross-sectoral) morbidity-based care needs based on claims data from the statutory health insurance system.

Methods
Based on the classification of more than 9 million insured persons into PopGroups, the average use in various care sectors (e.g. ambulatory medical care, inpatient care, day surgery) per capita in each PopGroup was first determined. To estimate healthcare needs for different types of services in selected regions, the average nationwide use per capita per PopGroup was multiplied by the number of individuals per PopGroup in the region and summed across all PopGroups. This expected use (based on the regional population's distribution into PopGroups) is compared to the actual observed utilization. Discrepancies between observed and expected use may indicate undersupply or oversupply in certain areas of care. For need-based healthcare provision planning, the required care capacities (e.g. doctors in ambulatory practices, hospital beds) can be derived based on the observed and expected utilization.

Results
Using an exemplary region, cross-sectoral results for selected care areas will be presented and discussed.

Discussion
The PopGrouper differs from existing approaches to measuring morbidity-oriented care needs, due to the high degree of morbidity differentiation. The aim of the application of the grouper presented here is to examine the extent to which PopGroups can contribute to improving the needs-based planning of health care provision structures in Germany.

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Mind The Gaps: A Novel Approach to Population Health Planning and Hospital Service Gap Analysis LYSIS

Yingyu Feng [a], Aladin Niazmand [b]

Introduction
Health service planning and Diagnosis-Related Groups (DRGs) are closely interconnected in the

context of healthcare management, particularly hospital services planning. However, previous studies generally only focused on one specific condition or specialty. There is a lack of a systematic approach that incorporates DRGs in hospital service planning.

Methods
We developed a novel healthcare demand prediction tool, a web-based Health Facility Briefing System (HFBS), paying special attention to the crucial role of DRGs in healthcare planning and resource allocation. This modelling tool automates the projection of healthcare demand for a prescribed area by service modes, specialities and DRGs based on the disease prevalence and the anticipated needs of specific patient groups. We used the Northern Territory of Australia as our study area and conducted a comprehensive assessment of the healthcare needs of the population using demographic data, epidemiological patterns, private health insurance coverage, health risks, and prevalent health issues. These data were incorporated into the HFBS system to derive hospital service gaps by service mode, speciality and DRGs.

Results
Our preliminary results showed that service gaps vary significantly across service modes, specialities and geographical locations. Respiratory Medicine, Gastroenterology and Cardiology rank the top three specialities in the acute overnight beds while Orthopaedics, Gastroenterology and Urology are projected to be the highest in demand for same-day places. A total of 90 adult medical overnight beds and 26 adult medical same-day places are required by 2036. The results facilitated the assessment of the need for new construction or expansion of existing hospitals and other facilities as part of the future Northern Territory health strategic planning.

Discussion
The novel automated health service planning system provides a good framework for health service planning. It assists health providers and planners in optimizing resource allocation and service delivery based on the changing health demands of the local population and urgent health issues. The DRG distribution can also guide the planning of health facilities to meet the needs of patients within different categories. The same methodology can be applied to other countries, regions, cities and local communities, allowing a systematic process of organizing healthcare resources and facilities based on patient diagnoses and treatments to meet the healthcare needs of the local population.

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Examining person level social determinants of health recorded in routinely collected healthcare data: insights into effects on healthcare utilisation

Paul Molyneux [a], James Barrett [a], Steve Sutch [b]

Introduction
It is widely recognised that social determinants of health (SDoH) impact on people's health and well-being. Indeed, they directly influence and shape individual social needs which may be expressed through digital social markers. These markers reflect the conditions and circumstances in which people are born, grow, live and work. Understanding and addressing social need is critical for health and care systems to improve health outcomes and successfully tackle health inequalities.

One data point routinely available in the United Kingdom (UK) are the Indices of Multiple

Deprivation (IMD). IMD is a geospatial statistical measure used to assess and quantify the level of deprivation experienced by communities and areas. One major constraint is the fact that this is an aggregate measure, and the deprivation score may not accurately reflect a specific individual's social needs. With this constraint in mind together with advances in digital infrastructure and clinical documentation, it's both important and timely to investigate person level data and learn more about people's circumstances above and beyond the medical model.

Methods
With the increasing availability of linked data assets across the UK we were able to examine the availability of person centric social markers. This study involved reviewing routinely collected primary and secondary care records, assigning specific concepts to domains of social need, and creating novel person level markers. This allowed us to measure the breadth and depth of social need markers and explore their utility as part of innovative decision-making processes.

Results
We will share three key insights:

1. Description of how many people have social markers together with the quality and completeness of those markers across different domains.
2. The association between individual social markers and IMD and how the two markers may be used in concert.
3. Examination of the utility of these markers, considering policy decisions, resource allocation, cohort identification and care model design and implementation at both a system and individual level

Discussion
This remains a relatively unexplored topic and there are clear gaps in the coverage of social needs available in routinely collected healthcare datasets. This is not surprising given that the datasets accessed were designed for a different purpose. However, there are still a considerable number of markers documented which represent genuine social need that was deemed sufficiently important and relevant to capture as part of clinical contacts.

These markers have a relationship with the relative deprivation associated with the area within which people live and a strong association with negative outcomes that are independent of clinical markers of risk. These novel social markers may well prove to have real-world utility, certainly in helping to describe additional needs of cohorts which will help tailor interventions more appropriately. The limitations of these markers should not be overlooked however as there are known gaps and they should be used with this element of bias in mind.

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Casemix and clinical coding (3)

Audits over the billing of medical healthcare services in the field of hospital care

Tina Medved [a], Marjana Gaber [a]

Introduction
In the year 2022, every resident in Slovenia underwent more than 14 examinations by doctors at various levels of healthcare. One in five received hospital care.

The volume of services provided and billed requires constant control over the correctness of billing. The main objective of a medical billing audit is to ensure that billing practices comply with standards, legal requirements and insurance guidelines.

There are different levels of controls to ensure that the billing of services is correct. Medical billing auditing of hospital services is part of the Medical billing auditing of hospital services performed by the Slovenian Health Insurance Institute of Slovenia (HIIS or ZZZS: Zavod za Zdravstveno Zavarovanje Slovenije).

Methods
The data on the services billed, which are reported monthly by the healthcare providers to the ZZZS, form the basis for the medical billing audits. Financial medical audits in particular are usually carried out directly at the service providers, where compliance with valid billing codes is verified, and the content of the medical records of services performed is compared with the data of recorded and billed services. It involves assessing the accuracy, completeness, and compliance of billing records, coding practices, and reimbursement processes.

In Slovenia, the majority of hospital activity is billed according to the DRG coding system. From January 1, 2023, we use the new version of Coding Standards - Australian Version 11 and the Slovenian Supplements, which are based on the Australian Coding Standards for ICD-10-AM and ACHI (c) Copyright Independent Hospital Pricing Authority 2019, Eleventh Edition.

The Slovenian supplements are compiled in Appendix B. They resolve some of the ambiguities encountered and give instructions on correct coding for the most prevalent issues identified, written in the form of questions and answers.

Results
In 2022, ZZZS performed 715 medical billing audits in total. 336 were administrative audits, and 379 were financial medical audits, 61 of which were audits over billing for hospital activity.

There was a total of 8,750,000 EUR of inadequately charged services, which means almost 144,000 EUR per individual financial medical audit over hospital activity. An average of 17.7% of miscalculations were found, which represents just over 25,000 EUR per individual financial medical audit.

Verification of the coding process is the most crucial component of the financial-medical billing audit checklist. When auditing the billing of hospital treatments, certain types of errors occur for all providers. Over-coding is the most frequently identified, mainly due to non-compliance with the criteria of coding standard 0002 (additional diagnoses).

Discussion
An accurate financial-medical billing audit is a complex procedure.

Although the coding rules are written, we must be aware that choosing appropriate diagnoses and billing procedures is largely a matter of individual discretion. ZZZS ensures consistency of judgment through regular training and frequent consultations within the group of supervisors.

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Medical time spent on producing health data in French hospitals and organizational leverages to reduce it

Etienne Joubert [a], Fabien Joubert [a], Ines Bozinovic [a], Sophie Guéant [a]

Introduction
The performance of health resource allocation is associated with health data volume and quality. However, raising the data demand increases the administrative burden of healthcare professionals, which is becoming harder to bear in France. Few papers focus on the data production process issues in healthcare organizations. At the beginning of 2023, the French technical agency for information on hospital care (ATIH) conducted a quantitative study to assess the burden on clinicians associated with producing and collecting medical data, with two main objectives: (1) to produce an inventory of health data production methods and (2) to quantify the average weekly time spent by clinicians on producing and collecting hospital health data.

Methods
An online questionnaire was distributed to every health information department's head in short-stay hospitals, for transmission to clinical departments. In addition to the standard identifying variables (hospital's identification number, department speciality, etc.), the questionnaire was used (1) to identify the role of the various professionals (physician, paramedics, administrative workforce, health information professionals, etc.) in collecting ICD-10 diagnoses and procedures codes, and (2) to evaluate the average weekly time spent on producing medico-economic data, research data, data used for internal management purposes, etc.

Results
The results of 193 departments out of 349 respondents from 91 healthcare institutions (out of 1817) were analysed. Diagnosis coding organization depends on the hospital's profile: the smallest public hospitals, private non-profit hospitals, and surgical departments appear to use professional coding more frequently than the other departments. Concerning the procedure coding, practitioners almost always identify the code corresponding to their practice. The median time spent producing medical information is estimated at two and a half hours, with a distribution of the last quartile range from six and a half hours to thirteen hours per practitioner per week. There is a significant link between time spent producing health data and the domain of activity, the hospital's size, and the organization of the production process. 57% of the observations had a full professionalized diagnoses coding process, meaning without any physician intervention. The time spent by practitioners in this last organization was two hours vs four hours in a non-professionalized organization. The load on healthcare professionals appeared to be significantly reduced, especially on the last part of the production process, which is data entry on software platforms.

Discussion
Despite the limitations of the analysis due to the relatively small volume of data, it appears that the

time spent by healthcare professionals in health data production is highly variable. There are multiple ways to reduce the burden on healthcare professionals, such as professionalizing data production, especially on the low-adding value steps of the data production process.

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DRG: Establishing and strengthening a robust medical coding auditing program in Greece.

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Introduction
The implementation of a DRG system in a country raise concerns about the accuracy of medical coding. Since the quality of hospital discharge data has a significant impact on the allocation of cases to DRG, it is crucial to elucidate the relationship between case mix and accurate medical coding.

Methods
This study, which co-founded by the EU & the Greek Government, examined the already grouped DRG cases from the first year of implementation in the region of Crete. A sample of 130,000 cases out of the total 200,000 cases were analyzed and audited. The audit process consisted of the following stages:

Digitalisation: The Greek DRG Institute developed a digital platform to support auditing, which resulted in the establishment and strengthening of medical coding control mechanisms. This intervention aimed to identify and address any discrepancies between the coding of a patient's medical record and the allocated DRG, based on the Greek Coding Guidelines.

Auditors training: A team of highly skilled auditors underwent specialized training in medical coding according to DRG, conducted by experts from the Greek DRG Institute.

Control & consultation: The control and consultation of medical coding was performed by specialized and trained auditors, on a randomly selected sample of cases. The objectives of the control and consultation were as follows:

- to verify the accuracy of the classification of incidents in DRG,
- to ensure the completeness, in accordance with the information obtained from the patient's medical file,
- to assess whether the coding adheres to the Greek Coding Guidelines.
- to promptly address the phenomena of undercoding and overcoding, which are identified in the international literature and are addressed through ongoing training for coders.
- to enhance and streamline the process of medical recordkeeping, objectively showcasing the work performed by each hospital to promote fair resource allocation within the healthcare system.

Results
Results indicated that a significant proportion of DRG, with a length of stay greater than one day, were reclassified from the auditors into different DRG. This reassignment was not primarily due to errors in the selection of the principal diagnosis, but rather resulted of various coding errors, including

omitting the coding of secondary diagnoses and medical procedures that should have been included and utilizing less specific codes.

Discussion
These findings indicate that the provision of medical coding control and consulting services can be instrumental in the proper implementation of the DRG by fostering accurate medical coding and ensuring transparent allocation of resources within hospitals. As an ultimate goal, this approach could potentially shorten the duration of undercoding occurrences from the four to five years typically observed in international literature to a more manageable two years.

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The Fair Play Advantage: Navigating the DRG System with Ethical Coding for Optimal Performance - strategies to Identifying and Mitigating Gaming and Undercoding

Jana Wahl [a], Vesna Mesojednik [b], Simon Zupan [b], Marko Jug [b]

Background
The implementation of an updated DRG version in a large university hospital presents challenges, including the potential for gaming and undercoding.

Addressing gaming and undercoding requires a multi-pronged approach: continuous data monitoring, strong leadership, inter-professional communication, comprehensive coder training, and knowledge sharing.

Lack of knowledge about the updated DRG systems and details of potential co-payments in a fully implemented system, as well as insufficient knowledge among coders, can lead to unintentional errors and potentially contribute to undercoding, necessitating the creation of a core coding group.

This paper highlights valuable strategies and key learnings from a benchmarking exercise as part of an ongoing, coordinated effort in a university hospital to achieve accurate coding and optimized financial performance under the updated ArDRG system.

Methods
Public data available at ZZZS (National Health Insurance Fund) were obtained to compare DRG structures by adjacent DRGs for years 2019, 2022, and 2023, excluding 2020 and 2021 due to pandemics.

DRG groups were analyzed for UKCL and benchmarked against other hospitals.

The DRGs with greater differences among UKCL and other hospitals were identified and analyzed.

Results
Analysis of benchmarking data revealed potential signs of gaming and/or undercoding.

Bolnišnica / Končnica SPP	Bolniki			Graf	Uteži			Graf	Povprečna utež			Graf
	2019*	2022*	2023*		2019*	2022*	2023*		2019*	2022*	2023*	
	Delež	Delež	Delež		Delež	Delež	Delež					
UKC Ljubljana	**100,00**	**100,00**	**100,00**		**100,00**	**100,00**	**100,00**		**1,84**	**1,85**	**1,83**	
A	17,34	17,55	22,75		29,00	29,82	32,46		3,09	3,14	2,61	
B	37,79	38,70	53,58		25,60	25,37	44,91		1,25	1,21	1,53	
C	10,45	10,38	15,04		7,08	7,12	17,28		1,25	1,27	2,10	
D	4,20	3,52	0,71		2,39	1,98	0,33		1,05	1,04	0,86	
Z	30,22	29,85	7,93		35,92	35,71	5,02		2,19	2,21	1,16	

Table 1: DRG structure for University Clinical Center Ljubljana for years 2019, 2022, and 2023. A full table with data from other hospitals is going to be shown in the final paper.
Comparing 2019 (ICD10-AM v4), and 2023 (ICD-10 AM v10) in UKCL in 2023 the proportion of the structure in the group of the severe adjacent DRGs A and B increases, while the overall average cost weight decreases.

The structure of DRGs varies by type of hospital, in some cases contrary to what is expected.

Tertiary hospitals UKCL and UKCM have a roughly similar structure of difficulty.

In 2023, with the updated version an increase in the proportion of patients in the DRG group with severity A-severe (extensive) complications, B-moderate complications, and C-no complications was observed at UKCL, mainly due to the removal of some SPP groups with the Z ending.

Compared to the same period in 2022, the group A weight structure in UKCL has increased from 29.82 to 32.46, and when comparing the patient structure, from 17.55 to 22.75.

At the same time, it should be noted that in this group (A) the average cost weight per case of UKCL has decreased from 3.14 to 2.61 and consequently the average weight of all DRGs has also decreased from 1.85 in 2022 to 1.83 in 2023.

UKCM similarly has a higher proportion in difficulty A in both the patient structure (27.93) and the weight structure (33.58) compared to UKCL in the period 1-11 2023.

Both tertiary hospitals have the highest proportion of patients in difficulty B, UKCL 53.58 and UKCM 46.54.

In terms of the severity structure, some general or secondary hospitals stand out, with a higher proportion of patients in adjacent group A (i.e. the most severe patients) than in both University Medical Centers, up to 42%, and even more than 50% when looking at the weights.With regard to the latter, we believe that there are few possible explanations for these discrepancies. As other available data suggests that UKCL and UKCM treat the most complicated patients in the country, it may be necessary to conduct an external audit as well as an internal audit at UKCL to verify the accuracy of coding and identify any potential undercoding.

Conclusion
Identifying and Mitigating Gaming and Undercoding is critical for a fair DRG play.

An initial lack of knowledge of the new system was identified as a challenge requiring a coder training initiative using online education and peer support. Leadership and engagement with different professional cultures emerge as critical factors in promoting ethical coding in hospitals. Tackling gaming and undercoding requires a multi-pronged approach with

- Ongoing monitoring and analysis of benchmarking data
- Strong leadership commitment to ethical coding practices.
- Effective communication and collaboration across professional cultures.
- Comprehensive training and support for coders on the new DRG system.
- Promoting knowledge sharing and continuous learning.

By implementing these principles, healthcare facilities can ensure accurate coding practices, promote transparency, and optimize their financial performance within the DRG system. In the end, ethical coding contributes to building trust and transparency within the healthcare system, which allows for the proper allocation of resources to support better patient care.

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Classification development (2)

Nordic Collaboration in NordDRG System Maintenance

Kristiina Kahur [a]

Introduction
The Nordic Casemix Centre (NCC) leads a collaborative effort involving Nordic countries- Denmark, Iceland, Finland, Norway, and Sweden-alongside Estonia and Latvia as collabora- tive partners, focusing on the development and maintenance of NordDRG system. NordDRG is a casemix system which relies on primary classifications such as ICD-10 and the NOMESCO Classification of Surgical Procedures (NCSP). This abstract explores different tools and other enablers crucial to the on-going development of the NordDRG system. During the presenta- tion examples will be provided to elaborate and visualize the everyday work on the mainte- nance and development of NordDRG system.

Methods
To facilitate cooperation and NordDRG system development, several tools are utilized:

- NordDRG Maintenance System (NDMS): A program (rule editor) for maintaining and updating the NordDRG national definitions, allowing export in various formats. The master version is managed by the NCC. A stand-alone version (equivalent to the latest production version of NDMS) is available for national organizations.
- Maintenance of Basic Classifications (MBC): An integrated module within NDMS, linking national diagnosis, procedure, and ATC codes to 'backbone' classifications (ICD+, NCSP+, ATC+).
- Nordic DRG Grouper: A program that assigns patient information into DRGs based on NordDRG definition tables. It is incorporated into NDMS and is available as well as a stand-alone version.
- NordDRG Forum: A virtual communication platform facilitating communication between the Expert Group and the NCC. The Forum also allows to document all issues that are relevant for the NordDRG system updating process.

In addition, the work is facilitated by NordDRG Expert Group - the primary advisory group, consisting of experts from participating countries, meeting biannually to discuss updates and developments of NordDRG system.

Results
Through the coordinated use of different NordDRG tools, and the expertise of the NordDRG Expert Group, the NCC continuously maintains and updates the NordDRG definition tables for each national organization. The intellectual property and accuracy of national tables rest with the respective national organizations.

Conclusions
The maintenance and updates of the NordDRG system are based on a structured and collab- orative effort, utilizing the NordDRG tools and input from the Expert Group. The work is co- ordinated by the NCC. The combined contributions of different enablers collectively contrib- ute to the system's efficacy. This collaborative model may serve as a benchmark for other regions or countries seeking to enhance their DRG systems.

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Discussing with your casemix specification with natural language: how to make Large Language Models (LLM) understand NordDRG logic?

Tapio Pitkäranta [a]

Introduction
Recent advancements in large language models (LLMs) have sparked significant interest across a broad spectrum of use cases and business domains [1,2,3]. This paper delves into the application of LLMs in interpreting the complex logic of the NordDRG system [4]. Our findings suggest that the current general LLMs struggle to effectively handle the NordDRG logic. However, when LLMs are enhanced with Retrieval Augmented Generation (RAG) [5], the enhanced NordDRG AI agent is capable of engaging in natural language conversations with various stakeholders. This paper provides a comparative analysis between the general LLM and the RAG-enhanced model, highlighting the latter's enhanced ability to address specific queries related to DRG logic. Such progress marks a significant stride in healthcare information systems, presenting a user-friendly interface for intricate medical coding systems.

The Nordic Diagnosis Related Groups (NordDRG) system plays a critical role in healthcare resource management. However, its intricate logic poses a challenge in understanding and navigation. Addressing this, our study explores the potential of AI, particularly LLMs, to simplify DRG logic interpretation through natural language processing.

Methods
We implemented a RAG AI model, where the NordDRG specification is indexed using a retrieval model. The LLM component serves two functions: it formalizes user queries into a structured format and synthesizes the retrieved information into coherent responses. This dual approach enables the RAG model to provide contextually relevant information in a conversational manner.

Results
The paper details example dialogues between various stakeholders LLM based AI Agents. These interactions showcase the AI's ability to understand complex queries and provide accurate, context-aware responses. The RAG model's performance was markedly better than the general LLM, especially in interpreting detailed DRG logic.

Discussion
Our findings indicate that while general LLMs struggle with the nuances of specialized medical coding system such as NordDRG, the RAG model's dynamic retrieval capability significantly enhances its performance. This improvement underscores the model's potential as a valuable tool for healthcare professionals, aiding in decision-making and administrative tasks.

Conclusions
Integrating RAG AI into the NordDRG system marks a significant advancement in making medical coding systems more accessible. This technology promises to streamline administrative processes and support healthcare professionals in managing complex coding tasks. Future research should focus on refining the AI model and exploring its application in other specialized medical systems.

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Building a DRG-classification for Hospital Home Care in France: challenges and outcomes

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Introduction
In France, Hospital Home Care (HHC) enables medical care that would traditionally require a hospital setting to happen at home. Home care is allowed under specific circumstances. First, the patient, family members living in the same home and the referring physician must give their agreement. Second, only a subset of care and professionals are allowed. In recent years, French health care authorities have advocated for an increase in the use of HHC, and with it rose the need for proper tools to monitor HHC activity. Every HHC stay is coded and stored in a central national database, using nomenclatures such as ICD-10 for diagnoses or the French procedure classification (CCAM). Currently, only a small subset of these variables is leveraged. Our goal was to build a Diagnosis Related Groups (DRG) classification of stays for use in the French HHC sector, like the already existing schemes in acute and non-acute hospitals, with an emphasis on improving medical description and homogeneity.

Methods
HHC stays are grouped into main-DRGs with a grouping algorithm. Variables used to group are age, length of stay (LoS), diagnoses, procedures, and two variables specific to HHC: main and secondary type of care (MTC & STC). Most of the main-DRGs can be split into severity levels, describing the patient's comorbidities being cared for beyond the main condition. To set a severity level, all codes used to group the main-DRG are removed from the stay and the grouping algorithm is run again, looping until there are no remaining medical information to leverage. Additional groups can increase the stay's severity. Last, the stay's complexity is determined by patient-centric variables: the Karnofsky Index, Activities of Daily Living (ADL), age and social and environmental factors. Complexity describes variations in the cost of delivering care imputable to non-medical patient circumstances. The classification's performance was assessed by comparing the Rē on LoS and costs, as well as qualitatively through experts use and feedback.

Results
The HHC DRG-classification has 100 main-DRGs, yielding around 500 final DRGs after severity and complexity splits are considered. The Rē on LoS is now 16.9%, against 6.1% for the previous model, and 26.6% (vs 17.7%) on costs. Additionally, experts felt that their daily practice in HHC is adequately described by the new classification, which now allows for a clearer medical description and more homogeneous groups. A national experimentation began in July 2023, where all HHC stays

are grouped with the new classification, and providers are informed of the results without financial impact.

Discussion
In collaboration with multiple groups of medical experts working in the HHC sector, we built and experimented a DRG-classification that adequately describes HHC activity in France. With HHC activity on the rise for the foreseeable future, this new tool paves the way for the next steps in HHC policy, such as a financing reform that could rely on the new classification to better reimburse providers for HHC stays.

[a] French technical agency for information on hospital care (ATIH), France

Restructuring the DRG system in rehabilitation and psychiatry: Cost assessment made easy with an analysis tool

Samuel Noll [a], Johannes Kofler [a], Stefan Oesch [a], Simon Hölzer [a]

Introduction
In the intricate landscape of the Swiss healthcare system, SwissDRG Inc. stands as a collaborative beacon, bringing together service providers, insurers, and cantons to meticulously craft and refine inpatient tariff structures. To achieve this, providers from acute care, psychiatry, and rehabilitation sectors annually submit patient and cost data at the case level. Patient data, including diagnoses, treatments, and other pertinent information, forms the bedrock of this endeavor. A key aspect of SwissDRG Inc.'s continuous work on tariff development involves carefully assessing and improving the current medical DRG logic. These adjustments, influenced by medical and statistical factors, respond to new data and user requests. To support this detailed process, SwissDRG Inc. utilizes RiDE, its proprietary software platform, to evaluate modifications to the grouper, commonly referred to as Grouper modifications. In the course of developing the more recent day-based versions of the tariff structures for psychiatry and rehabilitation, heavy emphasis has been placed on addressing fundamental statistical questions. These include inquiries such as: How can modifications be comprehensively evaluated? What metric serves as an indicator of the overall benefit of a modification? To address these issues, SwissDRG Inc. has developed a new application designed to explore and quickly evaluate potential modifications: The Correlation Analysis and Split Exploration (CASE) Dashboard. This innovative tool empowers SwissDRG Inc. to swiftly explore and evaluate potential modifications, propelling the development of robust and equitable tariff structures.

Methods
The CASE Dashboard, a web-based R Shiny Dashboard, serves as an invaluable internal resource for employees actively engaged in tariff structure development.

Results
Access to patient and cost data empowers SwissDRG Inc. to measure and compare medical and cost homogeneity between two groups. Traditionally, R^2 has been the cornerstone metric for evaluating the benefit of a modification. This metric assesses the goodness of fit of the modelled daily flat-rate in relation to the actual costs of a case within DRGs. However, in the context of tariff structures characterized by a daily flat-rate remuneration scheme, as prevalent in psychiatry and rehabilitation, R^2 alone proves insufficient for determining the effectiveness of a model. Additional metrics, including mean daily cost comparisons, homogeneity coefficients, and statistical R2, must be considered to gain a comprehensive understanding of a modification's impact. The CASE Dashboard meticulously incorporates a diverse range of these metrics, providing a holistic perspective on the

potential consequences of any proposed changes. Beyond metrics, SwissDRG Inc. has developed a set of criteria to gain a comprehensive understanding of a modification's impact. These criteria, such as one that focuses on potential clinic effects, serve as decision-making aids in determining whether a proposed system modification should be implemented.

Discussion

Implementing the CASE Dashboard has significantly accelerated the process of the tariff system development, by allowing real-time simulation of system modifications and by providing instant cost comparisons. For example, in situations of uncertainty regarding which diagnosis lists should be considered for upgrading to a higher-rated DRG, all combinations can be examined with just a few clicks. A multitude of metrics and criteria can be compared to obtain a data-driven and balanced decision-making foundation.

[a] SwissDRG AG, Switzerland

Posters

Easy-ICD - a tool to predict ICD-10 gastro codes from Swedish discharge summaries

Andrius Budrionis [a,c], Taridzo Chomutare [a,c], Therese Olsen Svenning [a], Hercules Dalianis [a,b]

Introduction
Studies conducted in Norway and Sweden reveal that manual ICD-10 diagnosis coding is both time-consuming and prone to errors, with reported error rates in Norway reaching up to 20-30 percent (Riksrevisjonen 2016), and in Sweden main diagnosis was missing in 0.9% hospital and 10% primary care 10% encounters.

The digital storage of vast amounts of unstructured data in Electronic Patient Records systems calls for machine learning algorithms to assist clinical coders in their daily work. The effectiveness of Natural Language Processing and Artificial Intelligence methods in various text processing tasks, including text classification, topic modeling, machine translation, and text summarization, has been well-documented and these algorithms are already in use in various fields. These factors have paved the way for the development of Easy-ICD, a tool that can suggest ICD-10 codes for discharge summaries based on free text contents.

Methods
The core of Easy-ICD is a machine learning model trained to predict ICD-10 diagnosis codes. This model was developed by continuously pretraining Swedish general language model KB-BERT on 17.8 GB of deidentified Swedish clinical text. This process resulted in a model called SweDeClinBERT (Vakili et al. 2022) that was supplemented by classification layer and trained on 317.971 Swedish discharge summaries from 113.174 patients (Lamproudis et al 2023) for the ICD-10 diagnosis code prediction task. The final model was evaluated for the most common (top 80%) and all code scenarios.

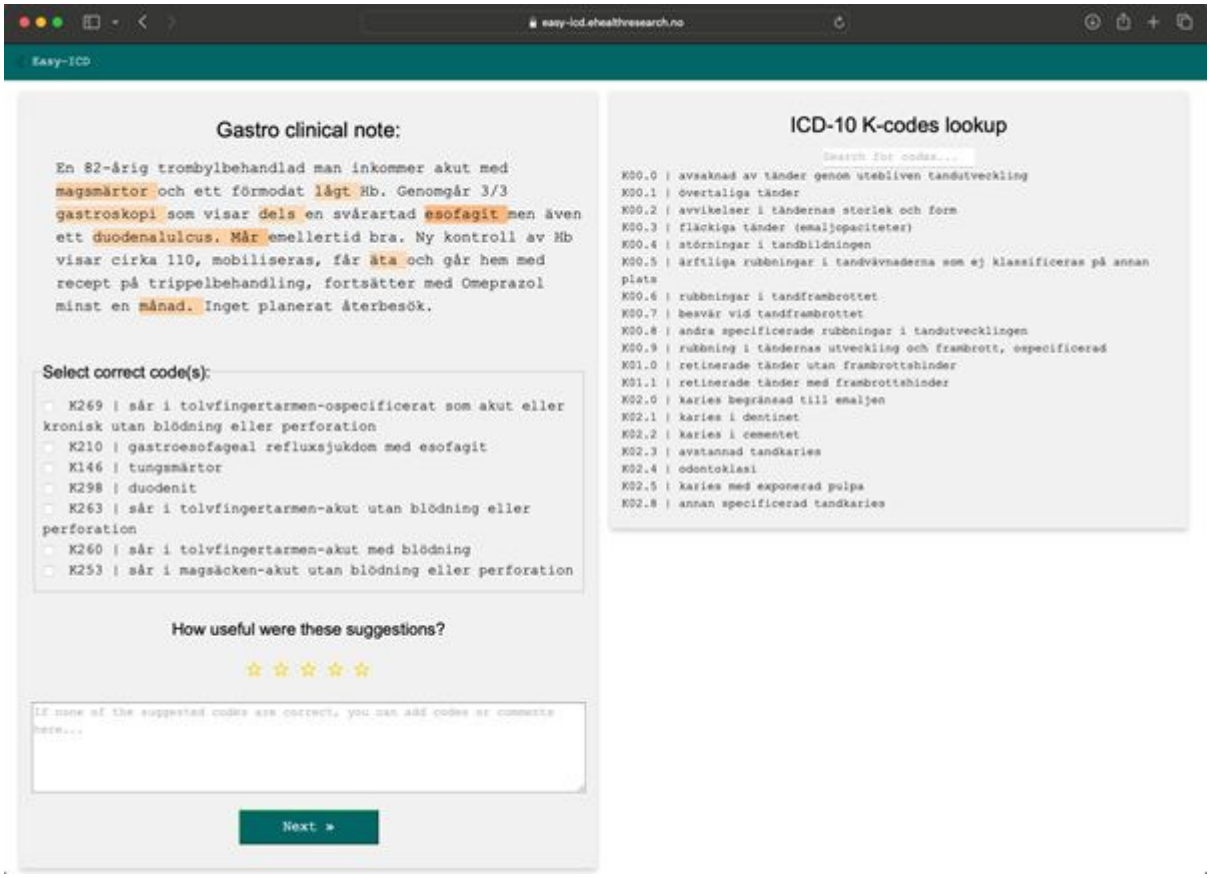
Results
The performance of SweDeClinBERT tuned for ICD-10 diagnosis code prediction task is listed in Table 1 below.

Table 1. Predictive performance of SweDeClinBERT tuned for ICD-10 code prediction task

	F1-score	Precision	Recall
All codes	0.88	0.88	0.88
Top 80% codes	0.94	0.94	0.94

To make this model available for the end users, a web application was developed and deployed online (https://easy-icd.ehealthresearch.no/). The user interface of Easy-ICD web application is depicted in Figure 1.

Figure 1. User interface of Easy-ICD application



A user study using the Easy-ICD application is currently in progress. It studies how this tool affects clinical coding practices in terms of code quality and time consumption.

Conclusions

This work demonstrates the feasibility of developing a tool capable of suggesting ICD-10 diagnosis codes from clinical narrative with relatively high accuracy (Table 1). While we have to acknowledge that the current work is limited to Swedish language and K-codes in ICD-10 hierarchy, the findings confirm that addressing these limitations is solely dependent on access to relevant datasets. The methodology of this work can be reused and scaled to cover all ICD-10 codes and can also be adapted to support other languages. Work to reproduce these findings in Norwegian is currently ongoing.

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Comparative analysis of the efficiency and quality of services in two groups of general hospitals in Serbia

Simo Vuković [a], Mirjana Milošević [a], Biljana Trivić Ivanović [a], Marina Topalovic [a], Drasko Lazović [a]

Introduction
Objective of the work: Comparative analysis of two groups of general hospitals (GH) in Serbia - those with below 400 beds capacity and those with above 400 beds capacity, based on certain indicators of efficiency and quality and case-mix tools.

Methods
Data from the electronic invoice system of the National Health Insurance Fund related to 38 public GHs (founded by the Republic of Serbia) were collected and analyzed for 2022 and the first six months of 2023. The analysis of the work of the GHs has been based on the following indicators:

- Case-mix index, which measures the average relative DRG weight
- Average length of stay (ALOS)
- Admission criteria, which measure the rate of unjustified admissions to hospital
- Inpatient mortality rate within 48h from admission
- Acute myocardial infarction (AMI) mortality rate
- The same-day hospital rate, which measures surgical and invasive-diagnostic procedures in same-day cases rather than through ordinary hospitalizations
- The rate of patients treated with reserve antibiotics
- The average cost per episode of care (per patient), which measures the hospital acute inpatient care expenses.

Results
The overall analysis showed heterogeneous results when comparing the two groups of hospitals. In general, it is not possible to directly associate bigger GHs with better results. The average relative DRG weight of the big and small GHs is basically the same, as is their efficiency, quality and outcomes.

Discussion
However, this preliminary evidence may inform the discussion on the future role of these two groups of GHs and encourage further considerations with regard to the strategy of optimization of the health care system. More specifically, the evidence will help define priorities and allocate resources in the health care system, as well as provide basis for achieving substantial savings and economic efficiency while preserving the quality of health services.

[a] SECRP Serbia Emergency Covid Response Project, Serbia

Financial Implications Of Inaccurate Clinical Documentations Of Thirty Days Readmission Rate Of Acute Exacerbation Chronic Obstructive Airway Disease In A Non Specialist Hospital Northern Malaysia

Noor Shahieddah Fazil [a], Fawzi Zaidan Ali [a], Nur Atfina Sabri [a], Mohd Ridzwan Shahari [a]

Introduction
Government hospitals in Malaysia has been implementing casemix in phases since 2010. For the past 13 years, casemix data has been used as classification of patient, describing hospital activity and monitoring hospital quality output. In 2024 Ministry of Health has started a pilot project to use casemix as hospital budget allocation in one of the government hospitals. There are important parameters to be monitored in Diagnosis-Related Group (DRG) payment Average length of stays (ALOS), Readmission Rate, Volume of Patient, especially severity of illness 1 (SOI), upcoding and cost per stay. The significance of this study is to identify financial implications of inaccurate clinical documentation.

Methods
A retrospective cross-sectional study was carried out analysing casemix data obtained from Casemix MOH system, MalaysianDRG for the year 2019 using patient discharges from 2019 with diagnosis Acute Exacerbation of Chronic Obstructive Disease (AECOAD) from the highest readmission rate of AECOAD in government hospitals in 2018 & 2019. In 2018, national readmission rate was 10.3% compared to this Non-Specialist Hospital in Northern Malaysia (NSHNM) 33.3% (in 2018) and 38.4% (in 2019). Sixty one (61) coded medical records were selected, re-examined and re-coded by 4 casemix officers Malaysia Ministry of Health. These officers re-examined and re-coded the error code that was originally entered by the hospital coders. The pre- and post-clinical documentations and coding results were compared, and if there was any disagreement, the codes by the officers were considered the accurate codes. The cases were then re-grouped using a MalaysianDRG grouper to assess and compare the changes in the DRG and the price per case for DRG. The outcomes were then verified by a casemix expert.

Results
The accuracy of clinical documentation of primary diagnosis was 55.74% and incompleteness of other diagnosis documentation was only 1.64%. Coding accuracy was 100% for primary diagnosis and 59.57% for other diagnosis. The clinical documentation inaccuracy and incompleteness resulted in the assignment of different DRG codes in 46.81% of the cases which all had a lower assigned price per case. In total, the financial implication due to changes in the assignment of the DRG was RM26,081.78.

TOTAL SAMPLE	DIAGNOSIS DOCUMENTATION (%)		ICD-10 CODING(%)	
	PRIMARY DIAGNOSIS ACCURACY	OTHER DIAGNOSIS COMPLETENESS	PRIMARY DIAGNOSIS CODE ACCURACY	OTHER DIAGNOSIS CODE ACCURACY
61	55.74	1.64	100	59.57

Conclusions
This denotes that accurate coding was done on inaccurate clinical documentation of primary diagnosis. The quality of coding is a crucial aspect in implementing casemix systems. Intensive re-

training and the close monitoring of coder performance in the hospital should be performed to prevent the potential loss of hospital income.

[a] Malaysia Ministry of Health, Malaysia

Defining Best Practice across countries: International Health Information Management Literature Review

Stephen Badham [a], Manal Nasser Al Khalifah [b], Sharon Roumanos [a]

Introduction
An international literature review was performed to identify best practice across key areas within the health information domain. This was performed on behalf of the National Casemix Centre of Excellence (NCCoE) as part of the Development of Clinical Coding and Clinical Coding Related Governance Project. The review findings have informed the definition of the future state for national health infromation management (HIM) governance in the Kingdom of Saudi Arabia (KSA) and provide valuable insights for other countries.

Methods
The methodology involved an extensive review of published literature, with 276 articles reviewed across all continents, with KSA, Australia, USA, Canada, UK, and Ireland featuring predominately.

The focus was to determine the current situation across countries and to identify best practice in relation to the following areas:

1. Health information and health data governance and HIM frameworks;
2. Clinical coding quality and auditing;
3. Clinical documentation improvement programs;
4. Health information and coder education and training;
5. HIM workforce structure and career development:
    - Structure of HIM services;
    - Core functions and competency standards for HIM professionals;
    - Mechanisms to identify HIM workforce requirements;
    - Rewards for professional recognition.

Results
The paper will present on review's key findings and emerging themes of relevance for HIM internationally, including the importance of:

- Governance and Standards:
    - Strong information and data governance frameworks;
    - International and national data standards;
    - Classification systems;
    - Standardised data dictionaries;
    - Key Performance Indicators (KPIs);
    - Key resources from national HIM bodies.

- Technology:
    - Use of technology in coding;

- Processes:
    - Best practices in coding, audit and clinical documentation improvement (CDI);
    - Auditing and data quality assurance processes;
    - Importance of coded data and it use.

- People:
    - Structure and main roles of the HIM and clinical coder workforce;
    - Competency frameworks;
    - Career pathways and barriers to career development;
    - Coding training and education programs;
    - Rewards systems.

The paper will also present key areas impacting on HIM practices, and reflect on what these mean for the profession, including:

- Legislation, standards and regulations, including national safety and quality standards;
- Funding models for hospitals;
- Digital Health (EMRs) and emerging technologies for automation and efficiency, including coding software solutions;
- HIM and coding workforce challenges.

Conclusions
To be successful and meet the ongoing changes occurring in healthcare, HIM professionals must acquire new skills, continue their education and obtain new credentials. HIM professionals will increasingly be needed in specialist leadership, teaching, information governance and informatics roles. Roles and skills must align with industry needs which support high quality coded data, health information governance, EMR, CDI, funding, and research. It is important that HIMs build on their strong foundation of skills and knowledge and transform the workforce to ensure it can meet the future needs of healthcare. This will require new career pathways and academic curricula o meet future workforce needs, including informatics, big data, analytics, and information governance.

[a] Beamtree, Australia
[b] National Casemix Center of Excellence, Saudi Arabia

Differences in organising children's orthodontic care in Finnish Public Dental Service

Jari Linden [a]

Introduction
In Finland, the Public Dental Service (PDS) has provided annual examinations and free care, including orthodontic care to all the young (<18 years) since 1972. The major reform in 1.1.2023 changed the organization and financing of the welfare and health care services. The Finnish Government establised 21 welfare districts plus Helsinki and the Åland islands. The social- and healthcare services were transferred from the municipalities to the new Welfare Districts. This study aimed to survey differences in orthodontic care in the number of patients, length of orthodontic episode and work division among dental professions between five PDS units before the reform.

Methods
Using people's unique identifiers, data on patients, their dental visits, treatment measures and providers' profession were collected from the municipal databases in five PDS-units with about 320,000 inhabitants between years 2001-2013. The National Institute for Health and Welfare gave ethical approval. Permission to use local data was received from the directors in the PDS units. All patients that had orthodontic treatment provided were included. The number of orthodontic patients, the duration of orthodontic episode and time spent on orthodontic care were grouped by PDS unit, patient's year of birth and by provider profession (dentist, dental hygienist and dental assistant). Although dental casemix system was not available at the time of the research, the patients were grouped accordingly.

Results
About 40,000 children and adolescents visited the PDS each year and about 8000 were provided with orthodontic care. The percentage of children who received orthodontic care varied from 45% to 60% between PDS units (Fig. 1). The length of orthodontic care varied from 900 to 1500 days (Fig. 2). In treatment time there were great differences in work division between PDS units (Fig. 3)

Discussion
There were great differences between PDS-units in organising children's orthodontic care. New Finnish welfare districts should investigate with the means of casemix the care processes of past organizations to achieve better quality, cost-efficiency, and equity among population.

Acknowledgement of sources of funding: No funding

Figure 1. Percentage of children having had orthodontic care within the year of birth.

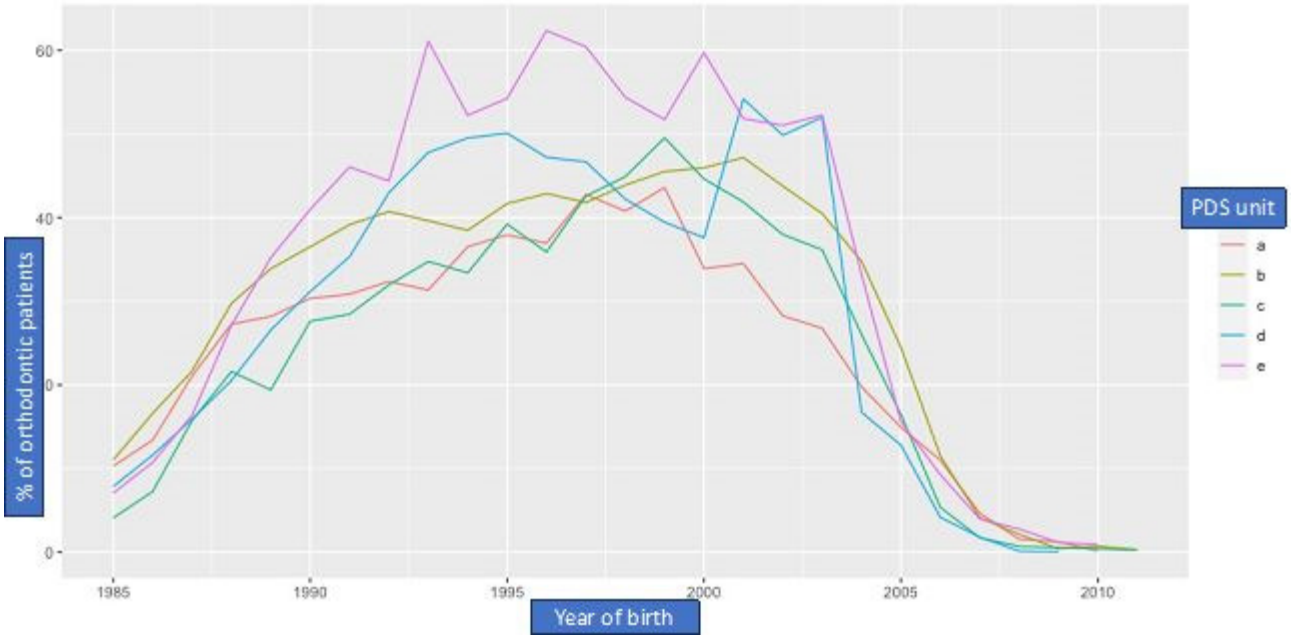


Figure 2. Mean of the length of orthodontic episode within the year of birth.

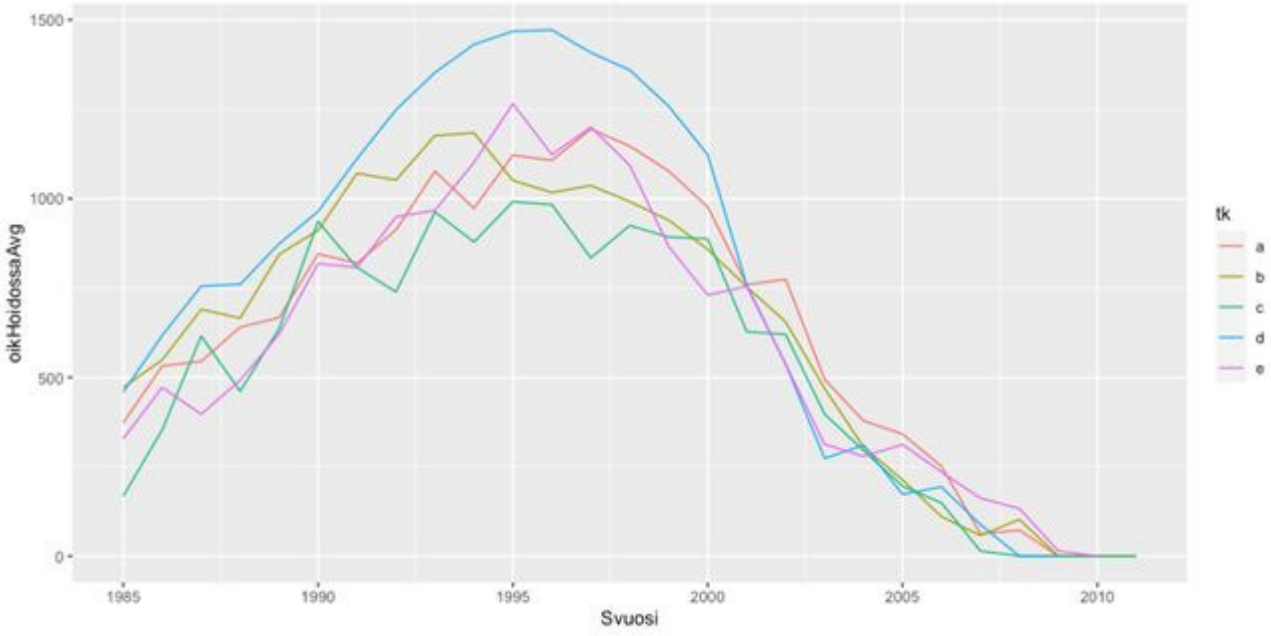
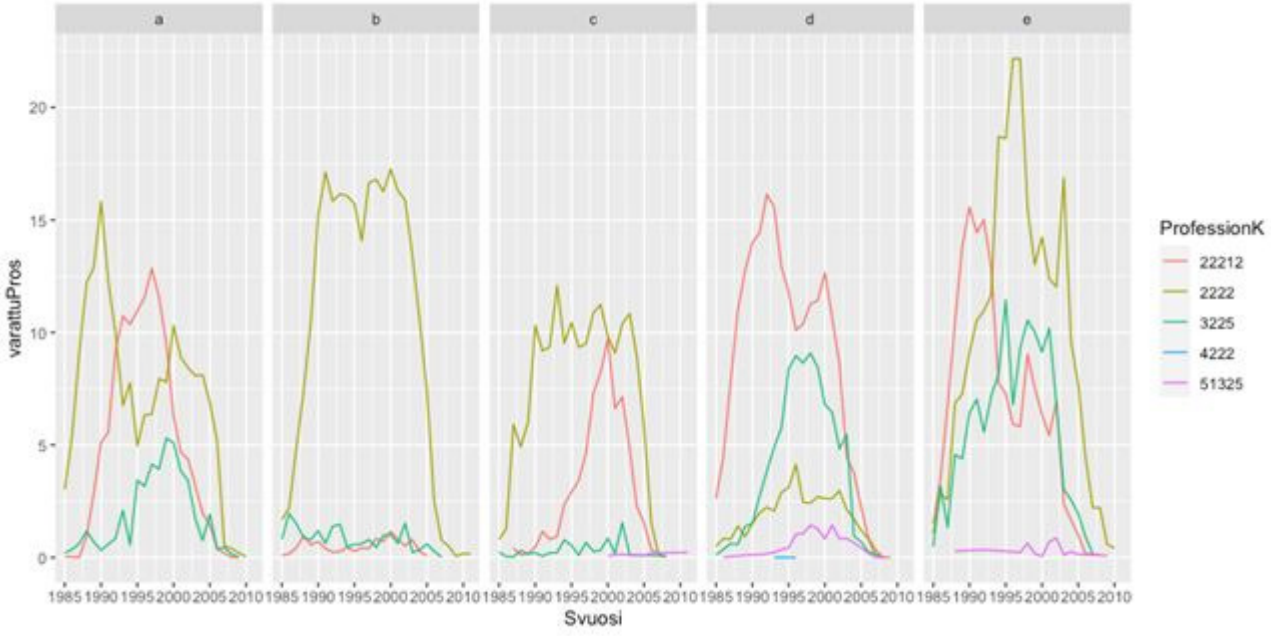


Figure 3. Percentage of treatment time on orthodontic care compared with the total treatment time within the year of birth.



[a] FCG Finnish Consulting Group,

Pediatric Inpatients Cost 2019-2023 - Study Report Serbia

Simo Vuković [a], Nikola Savić [a], Marina Topalovic [a], Mirjana Milošević [a]

Introduction
In Serbia, the costs of all hospitalizations financed by the NationalHealth Insurance Fund have been monitored since 2019, when DRG payment model was introduced. In the serbian payment model, DRG coefficients are used to calculate the performance of acute hospitals. Since DRG coefficients for pediatrics are different and costs for pediatric patients differ, there is a need for constant monitoring of costs and coefficients adjustment. The following pathologies stand out amang other pediatric hospitalizations: care of newborns after expensive and complicated births, stays due to rare conditions and organ transplants.

Methods
Study shows a trend of costs over the period for children 0 - 18 years of age, including the distribution of costs by DRG categories, average cost of hospitalization, ALOS, casemix index, total consumption of drugs, consumption of medical supplies, and the average cost according to the most common DRGs.

Results
Distribution of total hospital costs among patients devided by age shows a relatively stable ratio over the years. The highest total annual cost is represented in the group with patients 0-1 years of age. The DRG category with the highest annual cost is the category of newborns, followed by categoriy of diseases and disorders of the nervous system. The age group from 14 to 17 has the highest consumption of medicines including medical and sanitary materials. The most common DRGs show the cost growth over the time. The average cost per invoice has increased in the last (2023) year. The case mix index is the highest in 2020 during the pick of the COVID-19 pandemic.

Discussion
In addition to monitoring total hospitalization costs over time, it is necessary to monitor costs for individual DRGs. Costs can depend on the introduction of new drugs and new technologies in the treatment. Not every cost increase is a problem or requires intervention. It is necessary to monitor and adjust the DRG coefficients based on the annual analyses, so that hospitals that exclusively treat pediatric patients are financially sustainable.

[a] SECRP Serbia Emergency Covid Response Project, Serbia

Improving the information basis for decision makers: The critical validity of applying DRG-based patient severity indices for areas of application other than reimbursement[1].

Luka Dr. Bareis [a]

Objective
In numerous cases patient severity indices are an important information basis for decision makers in the healthcare sector, however, in many instances they have been misapplied. For example, in face of increased pressure for outpatient treatment in Germany, the Patient Clinical Complexity Level has been employed to estimate the outpatient potential in German hospitals. This study aims to illustrate

the risks of applying a risk-adjustment system for reimbursement in areas other than the intended one by comparing the performance of two sets of patient severity scales - reimbursement and clinical - applied to a clinical use case.

Research Design and Methods

In order to determine the outpatient potential of an anonymized German hospital (ca. 26,000 cases), we applied the following patient severity indices: Patient Clinical Complexity Level (PCCL), Disease Staging(tm) (DS)[2,3,4], Elixhauser Score (ES)[5], and the Charlson Index (CI)[6]. The former serves as a proxy for a patient severity index for reimbursement, the latter three are medical scales for clinical applications (ES and CI are the most adopted ones, while DS is the most comprehensive). Determining the outpatient potential of the sample hospital is our proxy for a clinical application. The employed methodology is descriptive statistics in the form of comparing frequency distributions of severity levels across those systems. Initially, we divide the PCCL according to the other scales to assess how comprehensive and detailed each system is in relative terms. When determining the outpatient potential, we adopt a prudent approach and set the cutoff values at the lowest level for each index.

It should be noted that a relative assessment between the clinical systems has some caveats, and a comparison of frequency distributions between them should be conducted with caution, as the results might be misleading (as opposed to the comparison between resource based and clinical based scales). An important distinction between DS and the other presented medical scales is that they are additive systems (a count of certain comorbidities) and treat every comorbidity equally (CI weights limited comorbidities to a small extent). This might result in somewhat arbitrary cutoff points, as it is unclear whether the presence of a more or less severe comorbidity is the determinant of a respective score, a differentiation is not possible. This means that for the clinical application at hand, only DS provides the most adequate assessment of the severity of individual comorbidities or the interaction thereof, which is to be expected as this is the most comprehensive system. For instance, DS classifies a certain type of mitral valve insufficiency as Stage 3.3 (one of the highest levels), where ES and CI only yield a score of 1 (the lowest score for covered comorbidities). This illustrates that many clinical scales cannot distinguish between individual comorbidities in terms of severity, an important aspect that needs to be taken into account when applying such scales to clinical problems. Further, there are significant differences in terms of the comprehensiveness between the systems. (17 diagnoses) compared to the ES (ca. 30 diagnoses) and the most comprehensive system DS (600 disease patterns and 5200 prognostic severity groups). For instance, 'chronic kidney disease, stage 5', or 'benign essential hypertension: with mention of a hypertensive crisis' are both classified as Stage 3.1 (high severity) for the DS scale, but are not considered (i.e. a score of 0) by the ES and CI.

Results

Fig. 2 shows the PCCL score of cases in an anonymized German hospital (approximately 26,000 cases), divided according to the respective medical scales. In more than half of the cases with a PCCL of 0 (lowest level), both DS and the ES classify cases into higher levels of severity. This suggests that these two systems provide a much more comprehensive and detailed assessment of clinical patient severity, also with regard to the extensive focus on the effect of comorbidities and interactions thereof (the latter only for DS). In comparison, the CI provides a much less detailed subdivision, reclassifying only about 20% of cases with a PCCL of 0. This is expected, as the CI considers by far the fewest number of diagnostic codes (see above).

In a further step, we can evaluate the collective declared as outpatient by the German AOP 2023 catalog concerning its actual outpatient potential according to each scale. In other words, we use different medical scales in addition to the official context factors (exclusion criteria) to assess, from a medical (diagnostic) perspective, how high the outpatient potential from the perspective of respective scales is. In contrast, we present the outpatient potential from the perspective of the PCCL and compare how homogeneously the respective scales indicate the outpatient potential.

In the examined hospital, ca. 30% of cases (~7000) fall under the inclusion criteria for outpatient

treatment. When evaluating this collective according to the AOP 2023 context factors (exclusion criteria) and the PCCL on one side, and the medical scales on the other side, based on severity, the outpatient potential results in different collectives (Fig. 3). In relation to the collective determined by the AOP 2023 catalogue affected by the inclusion criteria, the AOP 2023 catalogue indicates an outpatient potential of 19% (~5000 cases). Based on this population, the PCCL (< 3[7]) indicates a potential of 18% (relative to the entire population, i.e., an improvement by 1%), and the medical scales DS, ES, and CI show potentials of ca. 10% (Stage 1), ca. 8% (= 0), and ca. 14% (= 0), respectively (Fig. 3). Comparing these percentages (DS and ES exclude more than twice as many cases as the PCCL, and the less comprehensive CI (ca. 25%) it becomes apparent that, regarding the studied scales, the PCCL is the leastcomprehensive severity scale for the application at hand, as it does not consider relevant factors in assessing outpatient potential. For instance, cases with a Ventricular Tachycardia or Diabetes mellitus type 2 (decompensated) are classified as outpatient, which fall into higher severity levels according to the broader medical scales (e.g., DS Stage 2, not recognized by ES and CI).

Conclusion

The practice of applying a resource-based patient severity index to a clinical problem is associated with some challenges. For instance, when applied to determine the outpatient potential of a sample hospital, clinical scales exclude ca. twice as many cases as the considered resource-based index. This could be associated with tangible risks when decisions regarding clinical problems are based on misleading information. Hence, awareness regarding the correct application of risk adjustment tools should be considered an important constituent of good decision making in the healthcare sector.

Table 1: Comparison between the scales Disease Staging(tm) (clinical) and the Patient Clinical Complexity Level (resource)

	Disease Staging™ (DS)	PCCL
Präzise Diagnostik inkl. Einbezug der Ätiologie (DS kann bis zu 99 Diagnosen für die EW nutzen)	JA	NEIN
Die identifiziertem Fallschweregruppen sind klinisch homogen und prädiktiv	JA	NEIN
Die Behandlung selbst beeinflusst den Fallschweregrad	NEIN	JA
Das System kann ambulant wie stationär eingesetzt werden (z.B. zur Bestimmung einer rechtzeitigen Klinikeinweisung)	JA	NEIN
Der medizinische Ressourceneinsatz kann überprüft werden (Arzneimittel, Diagnostik, Blutprodukte etc.)	JA	JA
Überprüfung der Angemessenheit einer Behandlung	JA	NEIN
Einsatz über die Systemgrenzen (Data-Pooling) hinweg	JA	NEIN (nur Basis Algorithmus)

Figure 1: Case volume of the aG-DRG G67 according to the DRG severity levels (A/B/C) and Disease Staging(tm) - low concordance between resource-based and clinical-based case severity.

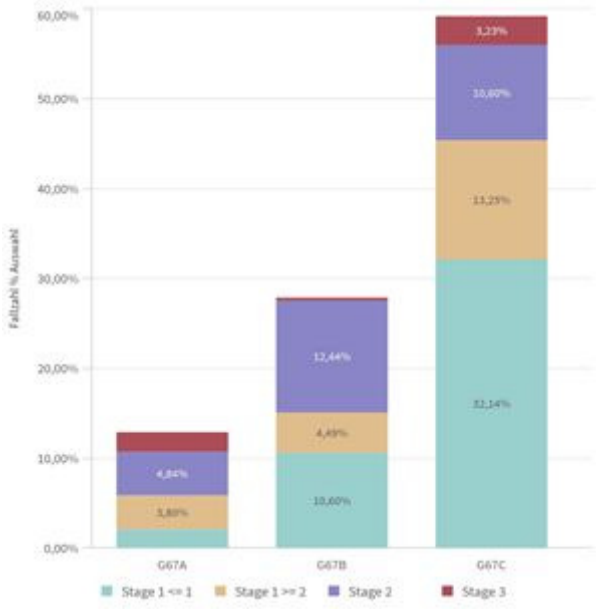


Figure 2: Frequency distribution of all cases from the sample hospital according to the PCCL and respective clinical scales

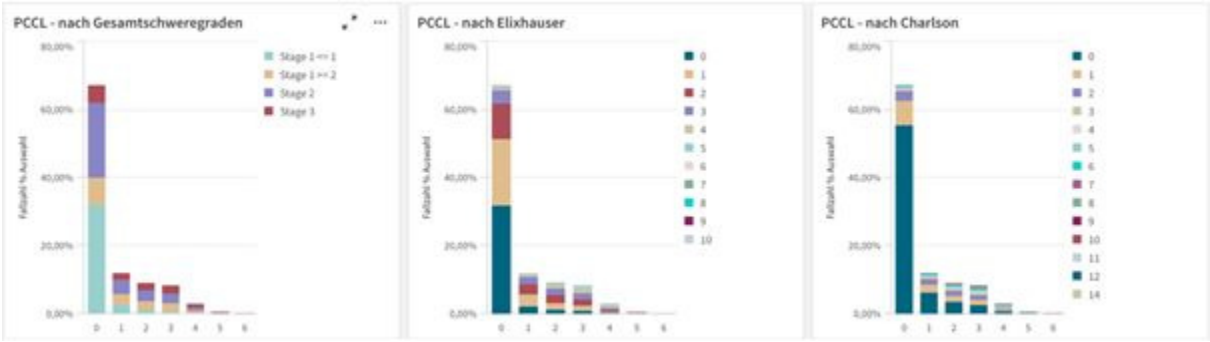
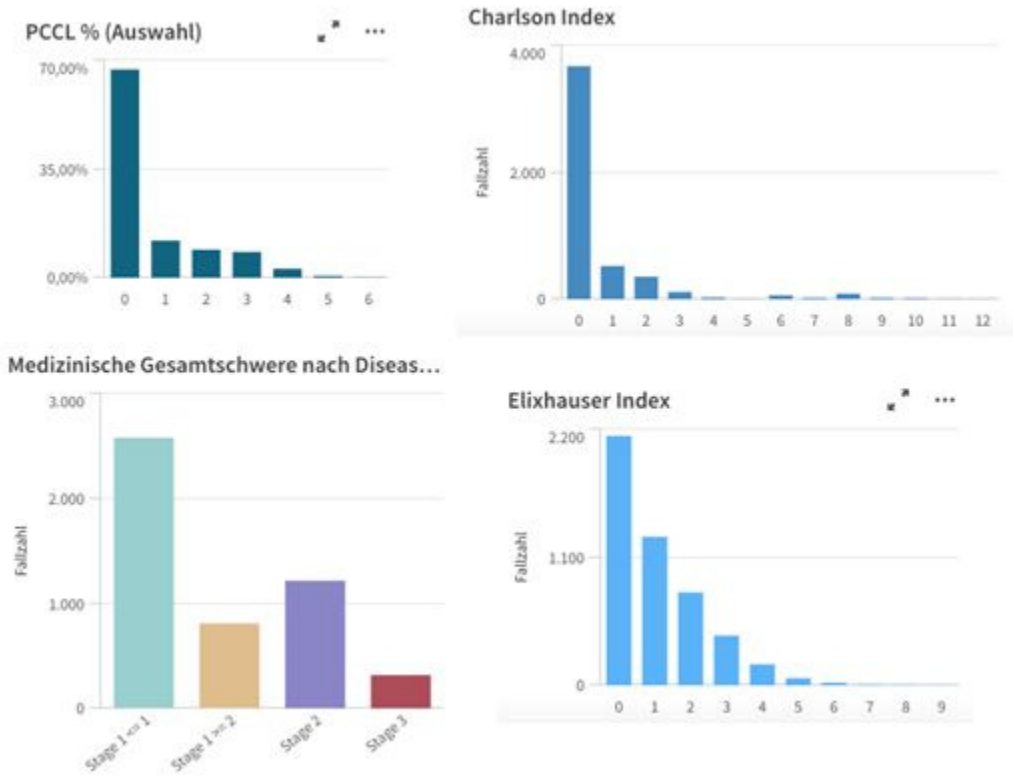


Figure 3: Frequency distribution of the officially recognized outpatient potential in Germany for the sample hospital based on the AOP 2023 catalogue according to studied scales



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Challenges in updating the DRG system

Martina Zorko Kodelja [a]

Introduction
In Slovenia, we have been using the DRG system since 2004, when we introduced AR-DRG v4.2. Since then, updates to the system have been rare: in 2013 the transition to v6, and in January 2023 we started using AR-DRG v10, ICD-10-AM/ACHI/ACS edition 11. The transition to the new version was very demanding for all stakeholders (public hospitals and private healthcare providers, Public health institute, Health insurance institute of Slovenia) to implement, mainly due to the vast amount of changes, including the impact on hospital revenues. The update of the DRG system is still not complete, as an essential part of the update is still missing - the calculation of Slovenian weights (we still use Australian weights).

Methods
At the beginning of 2023, we started using AR-DRG v10, ICD-10-AM/ACHI/ACS edition 11 for classifications and reimbursement of acute hospital treatment in Slovenia. More than half a year was needed for the translation and expert review, the amount of changes compared to edition 6 was enormous. A large personnel (translators and medical specialists) and financial investment (for the purchase of new AR-DRG version and grouper) was required. New software had to be installed in all hospitals, and coders had to be trained (a workshop was held in November 2022).

In parallel, hospitals established conditions for recording detailed data on costs. Together with them, we prepared a methodology for recording costs (of labour, drugs, materials, balance sheet costs), and the hospitals had to take care of updating their software, changing processes, and additional staff if needed. For this purpose, ZZZS is distributing each year EUR 2 million to pilot hospitals. This data will be used for calculating the new Slovenian weights.

Results
The new AR-DRG, grouper and coding rules affected hospital revenues. Some DRGs are no longer in use, some DRGs are new, and some treatments are classified differently compared to the previous version. To cover the different (better and worse) evaluation of DRGs in 2023 due to the impact of new AR-DRG, ZZZS planned an additional EUR 16.6 million for all providers in the DRG system (the same amount is planned for 2024. For comparison: the total cost of DRG services in 2023 is approx. 900 million). Nevertheless, due to the dissatisfaction of the hospitals, the Ministry of Health requested a change in the weights in such a way that no DRG should be weighted lower than in the previous version. Throughout the year, we regularly monitored the realization of DRG cases in hospitals and prepared a methodology for the distribution of these additional funds, with which we will mitigate the impact of the new AR-DRG version on hospital revenues as much as possible.

At the same time, throughout 2023, ZZZS collected data on costs from hospitals, which will be used to calculate the new Slovenian weights in 2024. We checked it and in cooperation with hospitals fixed errors. The quality of the data is still not at the level we would like (some hospitals still do not record all the required data).

Discussion
In 2024, the calculation of Slovenian weights is expected based on the collected data. At the same time, several questions and challenges arise:

- How often should we update the DRG system (implement new versions of AR-DRG and calculate new weights) so that it is sustainable from a financial, personnel and time point of view, and that the inclusion of new procedures, diseases and other changes in medicine is timely?

- In what way can we further improve the data based on which we will calculate Slovenian weights? How to encourage hospitals to make greater use of data also for their own needs?
- How to ensure the acceptance of the new Slovenian weights by all stakeholders and how to ensure the implementation and use of the new weights?

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Perception and knowledge of Korean doctors on the New KDRG payment system

Byoongyong Choi [a], Sukil Kim [b]

Introduction
Fee-For-Service (FFS) has been the main payment system for hospitals and clinics in Korea. The Korean Diagnosis Related Groups (KDRG) was introduced in 1997 as a pilot hospital payment system but failed. In 2009 the New KDRG for public hospitals was introduced, which is similar to the Japanese Diagnosis Procedure Combination (DPC) and doctors' procedures are paid to the hospitals separately. The previous government tried to expand the New KDRG to private hospitals to control uncovered items by the national health insurance. As of 2022, 98 hospitals among 1,775 acute hospitals are reimbursed by the New KDRG payment system.

More than 90% of hospitals are private in Korea. Doctors are employed by hospitals as salaried professionals in both public and private hospitals. Doctors' decisions in hospitals mainly determine the revenue of their hospitals and their specialist societies may influence on the way of DRG systems work (Busse, Geissler et al. 2013).

This study investigates doctors' perception and knowledge related to the New KDRG system.

Methods
The study participants are internal medicine doctors in 98 hospitals paid by the new KDRG system at least one year as of January 2022. A telephone survey was conducted to the participants. The survey questionnaire consisted of three items. The first items were the awareness and perception of the KDRG system using a 5-point scale. The second items were advantages and disadvantages of the system; two categories of 4 advantages and 4 disadvantages of KDRG system based on previous studies and policy intentions. Physicians were instructed to select no or one option for each category.

Student t-test for continuous variables and the Chi-square test for categorical variables were used with a significance level at 5% ($p<0.05$).

Results
A total of 312 physicians were participated in the telephone survey. The response rate was 35.3%. The awareness of the new KDRG system was 2.64±0.71. Physicians in private hospitals showed significantly superior awareness of the KDRG system in comparison to those in public hospitals (3.23±1.04 vs. 2.09±1.25, $p<0.001$). No significant variations were observed according to their length of service.

In terms of their perception of the KDRG system, overall respondents tended to converge toward neutrality (2.81±1.93). However, they showed a pronounced inclination towards a negative perception (1.63±1.31 vs. 3.17±2.09, $p<0.001$, Fig.1B). In physicians, negative perceptions of the

KDRG system were significantly more predominant in private hospitals than in public hospitals (1.29±1.34 vs 2.10±1.11, p<0.001), this trend intensified with longer years of service (1.15±1.21 vs 2.29±1.16, p<0.001).

115 (35.6%) physicians listed advantages: the expansion of health insurance coverage (43/115, 37.4%), reduction of cost (38/115, 33.1%), shortening of length of stay (22/115, 19.1%), and efficiency in resource utilization (12/115, 10.4%). However, all 312 physicians chose disadvantages: inaccurate payment for severe or complex conditions (128/312, 41.0%), diagnostic coding errors or upcoding (75/312, 24.0%), restricted adoption of new technologies (63/312, 20.3%), increased re-admissions or splitting admissions (46/312, 14.7%).

Discussion
Doctors have primarily highlighted concerns about payment accuracy as a major drawback of the KDRG system. Recent studies on the New KDRG also pointed out the inaccuracy issue (Kim, Jung et al. 2020, Kim, Choi et al. 2021) and the government need to build reasonable payment model. The level of knowledge among doctors remained low and there were prevalent negative views on New KDRG. Currently the hospitals are allowed to opt out from the pilot payment. But, considering DRG is the main payment system for hospitals around the world, good knowledge of Korean doctors on the New KDRG will be beneficial to the hospital management.

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Development and Implementation of the Korean Rehabilitation Patient Group (KRPG) Severity Scale: Enhancing Precision in Rehabilitation Patient Classification

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Introduction
In 2015, the Health Insurance Review and Assessment Service (HIRA) introduced the Korean Rehabilitation Patient Group (KRPG) and a Rehabilitation Patient Evaluation Table. These tools have since been utilized for designation and operational program of rehabilitation hospitals, enabling the identification and classification of potential patients into specific rehabilitation groups. The development of the KRPG classification model required a comprehensive consideration of severity from a clinical standpoint. Consequently, in 2022, a KRPG severity scale was developed with the objective of understanding the proportion of patients in critical condition at rehabilitation hospitals.

Methods
The development of the KRPG Severity Scale proceeded through three stages:

Step 1: Development of KRPG Severity Scale Items

Drawing insights from various severity assessment methods worldwide, we took inspiration from the Rehabilitation Complexity Scale-Extended (RCS-E) in the United Kingdom. This informed the development of common elements reflecting medical treatment needs and rehabilitation nursing services. Additionally, individual items were integrated to reflect age and functional assessment information, including cognitive function.

Step 2: Classification of Severity by Item

We analyzed data from the Rehabilitation Patient Evaluation Table to ascertain the statistical significance of the severity scale. Subsequently, scores were categorized into specific ranges for each individual item.

Step 3: Calculation of Final Severity

The final severity level was determined by amalgamating the severity assessments of common elements and individual items.

Results
The KRPG Severity Scale comprises common and individual items. Common items encompass 19 details, including consciousness, language disorders, swallowing/nutritional status, and others. Individual items consist of 7 elements, such as age, cognitive function (MMSE), and sensory/motor function (MMT, MAS, ASIA Scale). These items are assessed based on their scores, categorized into mild, moderate, and severe levels. The final severity classification encompasses a range from mild to severe, including the most severe category.

Conclusions
The KRPG Severity Scale was formulated through the analysis of data from the Rehabilitation Patient Evaluation Table, which reflects the clinical reality of rehabilitation patients in Korea, and through consultation with clinical experts. Aligned with medical treatment requirements, the KRPG Severity Scale has been integrated into government policy initiatives, enhancing the precision of classifying rehabilitation patients. In the future, at the request of the Korean Academy of Rehabilitation Medicine, we will review the need to incorporate rehabilitation therapy needs.

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Using new classification variables: Subdividing Disease Groups for Acute Stroke Patients

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Introduction
The Korean Inpatient Classification System (KDRG) categorizes patients into those undergoing

Operating Room (OR) procedures, internal medicine procedures, and non-OR procedures. In the case of the latter, the assignment of ADRG codes depends on the type of diagnosis code used.

Patients classified under B684 (Ischemic stroke and other non-hemorrhagic stroke), within the non-OR procedure group, may exhibit varying resource consumption depending on their stage of admission, such as acute, subacute following imaging diagnosis, or chronic phases. Consequently, diagnostic and treatment strategies vary significantly, leading to disparities in resource utilization.

Hence, there was a suggestion to subdivide the disease group by distinguishing between acute stroke patients and others.

Our objective is to differentiate acute stroke patients using new classification variables apart from the existing classification variable, the Korean Standard Classification of Diseases (KCD), within the KDRG medical disease group.

Methods

After gathering opinions from various internal and external sources, we reviewed four methods to differentiate acute stroke within the KDRG medical disease group:

1. Admission to a specialized stroke unit
2. Administration of intravenous thrombolysis
3. Observation of acute lesions consistent with stroke symptoms during imaging examinations such as CT or MRI scans, concurrent with stroke symptoms
4. Utilization of the criteria outlined in the "Standards for Calculating Co-Payment Reductions for Severe Diseases, Cancer Patients, and Rare Diseases" provided by the National Health Insurance Service (NHIS), which offers relief in personal co-payments for individuals affected by cancer, severe illnesses, or rare diseases.

Methods 1 and 2 included only some acute stroke patients, and Method 3 could not be collected from the claim data. Consequently, it was deemed most reasonable to distinguish acute strokes based on the application of the V275 code given to patients with a NIHSS score of 5 or more during inpatient treatment after arriving at the hospital within 24 hours of diagnosis of cerebral infarction (I63).

Subsequently, we conducted resource consumption analysis (T-test, ANOVA, Duncan) by subdividing the existing B684 disease group based on the application of the V275 code.

Results

In 2020, the existing B684 disease group recorded 69,611 cases, with 12,256 patients receiving the relieved co-payment code (V275), constituting 17.6% of the B684 disease group. Moreover, the minimum requirement for disease group subdivision, which is 300 cases, was fulfilled.

The analysis revealed that the average medical expenses for patients with the V275 code were 76.4% higher than those without it, and the average hospital stay was also 4 days longer. Statistical analysis showed a p-value of <0.0001 between the two disease groups, indicating a significant difference. Additionally, with a coefficient of variation (CV) of less than 100%, there was homogeneity within each disease group. Consistent differences were observed across subgroup analyses.

The disease group designation is as follows: when accompanied by the relieved co-payment code (V275), it is labeled as "Acute Severe Ischemic Stroke," while in other cases, it is termed "Other Ischemic or Non-hemorrhagic Stroke."

Conclusions

The establishment of a new medical disease group for stroke patients was a pioneering effort, integrating not only the conventional KDRG internal medicine classification variable but also incorporating the special estimate code (V275). Recognizing the need for patient differentiation in resource utilization and clinical context, we encountered limitations in distinguishing certain disease groups solely based on existing classification criteria. By introducing new classification variables for such disease groups, we anticipate enhancing the accuracy of patient classification and improving the reliability of KDRG development and management.

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