Abstract Book for the 35th PCSI Annual Conference

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Tuesday 27th September 2022 – Morning

Workshop 1 - Introduction to casemix costing

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 2: A smooth introduction to casemix for newcomers

FACILITATORS:

- Jean Marie Rodrigues, University Jean Monnet of Saint Etienne, Saint Etienne, France, Avignon Summer School Director, International Healthcare Terminology Consultant France.
- Olafr Steinum MD and Classification expert, Diaqualos AB, Uddevalla, Sweden. Expert consultant to the Swedish Board of Health and Welfare, Stockholm and to Nordic WHO-FIC Collaborating Centre, Oslo
- Deniza Mazevska, Health Policy Analysis, Sydney Australia

- Jim Pearse, Health Policy Analysis, Sydney Australia
- Jacob Hofdijk The Netherlands Foundation Partner Casemix, The Hague, The Netherlands
- Kristiina Kahur, CEO Nordic Casemix Centre, Helsinki, Finland

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.

Extending into other uses of casemix, we will discuss how it is used in assessing and improving quality of care. As new models of care delivery emerge, casemix continues to have a role. Our workshop will include a discussion on casemix systems for integrated care.

The session will conclude with an overview of the two schools run by PCSI:

1. Casemix and health care: What you need to know and do (formerly called the Summer School); and
2. Advanced Design and Implementation of Case-Mix Funding Models (formerly called the Winter School).

Workshop 3: Health care data governance: Meeting the skills needs of information quality advocates in the health sector

FACILITATORS: Mary E Black (Honorary Professor, Medical School, University of St Andrews), Paul O'Connor (Human Capital Alliance), Lee Ridoutt (Human Capital Alliance)

WHO WILL BE INTERESTED? Those responsible for collecting, maintaining and using the collected health data, the foundation of the healthcare system.

WORKSHOP OVERVIEW:

All countries face the challenge of creating and sustaining structures to collect, store safely and allow appropriate access to high quality data on health service activity and outcomes. These challenges are especially prescient in low- and middle-income countries. Without good structures data integrity

may be poor, the data may not be analysed (or only rarely) and the findings from analysis widely questioned.

A primary purpose of good data governance is to improve the quality of health data. This includes system wide data from primary, secondary, and tertiary care settings. However, the emphasis of low-income countries can be on the primary care sector while that of high-income countries will most likely be on the tertiary sector. There may be other differences.

Countries seek, as part of the remedy, to build the capacity of a cadre of people involved in data governance as custodians or stewards (these roles may be filled by the same person). How effectively (appropriate and comprehensive attainment of learning outcomes) and efficiently (as quickly as possible and for the least cost) this cohort of data quality champions is developed is critical for those countries wishing to build sustainable systems.

WORKSHOP OBJECTIVES: By the end of this workshop, participants will be able to:

1. Identify the learning needs of data stewards and custodians in countries with varying levels of development of data quality systems
2. Have an overview of the existence and availability (regional and world-wide) of appropriate learning opportunities (courses, study tours, online learning, scholarships, etc.) that could or do satisfy the identified learning needs
3. Be able to consider the gaps / deficiencies (including inefficiencies) in the current worldwide and regional availability of appropriate learning opportunities for data stewards and custodians

Workshop 4: From casemix to clinics

FACILITATORS: Prof. Dr. med. Michael, Professor for Hospital Management at the Medical School Hamburg (MSH) and CEO of inspiring-health GmbH, and colleagues

WHO WILL BE INTERESTED? Clinicians dealing with casemix, IT experts, casemix economists, clinical coding staff. Ideally, participants should be knowledgeable about their local casemix system, have some clinical background and have some knowledge of data structures and content that is today mainly used for casemix.

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?

Tuesday 27th September 2022 – Afternoon

Workshop 5: Towards patient-centred care in the health care network, share the drivers for change!

FACILITATORS:

- Jacob Hofdijk, The Netherlands Foundation Emeritus Partner Casemix, Utrecht The Netherlands
- Kristin Dahlen, senior adviser at the Norwegian Directorate of Health, Oslo, Norway
- Søren Vingtoft, Chief medical consultant at FIERS - Foundation for Innovation and Business Promotion in Region Zealand, Denmark
- Jim Pearse, Director Health Policy Analysis, Sydney, Australia
- Deniza Mazevska, Director Health Policy Analysis, Sydney, Australia
- Jeroen Struijs, Associate Professor at Leiden University Medical Center - Campus The Hague & Senior Researcher at RIVM, the Netherlands
- Mary E Black, Honorary Professor, Medical School, University of St Andrews

WHO WILL BE INTERESTED? The workshop is aimed to introduce new ways of health care delivery, from an institutional to a patient-focused approach, and the appropriate funding, preparing for the shift from treating disease to maintaining health. The audience is hopefully broad, from providers to decision makers.

WORKSHOP OVERVIEW:

All around the globe policy makers are faced with controlled increases in health care costs, with growing number of patients with multiple conditions, less trained clinical personnel and a decrease of the health of their population. The sustainability of the healthcare system is at stake. Due to the enormous vested interests of the current providers, short term solutions are not available, and the holy grail to shift from treating patients to maintaining the health of the population is hard to find.

But the good news is that the COVID-19 pandemic has intensified the use of digital tools in care provision, which seems to have changed the equation. Both patients and providers have accepted the benefits of new modalities of care provision. This seems nicely to coincide with initiatives like the green deal to help to fight climate change. It will have a great impact on health care, requiring a shift to more circular operations in the sector. So the time is right to rethink the organization and delivery of health care.

The journey we started at the PCSI conference in Scheveningen, The Hague, where the conference theme was Towards a sustainable health system, will be extended by this workshop, which will focus on the imperative requirements for the introduction of health care provision in the network of care. The workshop will introduce examples of changes in health care payment and delivery, based on real life experiences in different countries with a focus on person-centred care supported by digital tools and appropriate funding. A special focus will be given to the contribution of casemix to fund the new arrangements.

The workshop will address:

- the impact of Digital Care
- from Guidelines to Integrated care
- person-centred care coordination
- towards appropriate funding

- the new role of casemix
- the drivers for change

WORKSHOP OBJECTIVES: The aim of this workshop is to:

- Understand the origins of integrated care
- Share best practices of digital supported care
- Identify the imperative requirements for the introduction of integrated care and its appropriate funding and key design choices for the transition and the governance
- Discuss the new dimension of casemix on quality of care and use in quality improvement

Workshop 6: An Introduction to patient level costing and data analytics

FACILITATORS: Christian Pepin, Marc Hyndman and Charles Cockburn – PowerSanté

WHO WILL BE INTERESTED? This workshop will be particularly relevant to attendees from all disciplines, from clinicians, administrators, clinical coders and informatics professionals, as it will provide an overview of patient level costing and data analysis principles using worked examples, case studies and attendee participation

WORKSHOP OVERVIEW:

Participants will take an active role in defining the GL and patient costing methods. Participants, in groups, will be asked to review case studies and identify sub-optimal performance, the potential reasons for it and initiatives that may be used to overcome the problems.

Interactive participation will be encouraged through the use of question and answer sessions and workgroups.

Handouts will be provided, and the workshop will assume that participants have an awareness of Patient Costing and Data Analysis principles but little understanding of them.

WORKSHOP OBJECTIVES: Following attendance at this workshop, participants will have an understanding of patient costing and data analysis principles. In particular, they will understand:

- The concept of the GL Cost Allocation process, including the concept of Overhead and Patient Care Cost Centres, the use of Cost Allocations statistics such as Floor Area, Number of Meals Served, etc, the need to refine the GL for Patient Costing purposes and the methodologies for reconciling each step
- The patient level data feeds required and their elements
- The concept of Relative Value Units (RVUs) and their application to Patient Costing
- The concepts of loading, processing and reconciling patent level and general ledger data.
- Uses of Patient Level Costing data
- Methods for analysing the variability and quality of clinical practices from the Patient Level Costing results
- Methods for analysing Patient Level Costing results to improve financial performance
- Methods for using the Patient Level Costing results to document best practice and to support value-based management of care and services

Workshop 7: The systems, process and people underlying a patient activity data collection system

FACILITATORS: Marie Glynn, Mark O'Connor Healthcare Pricing Office, HSE, Ireland

WHO WILL BE INTERESTED? Delegates who are involved in the setup, training, auditing, reporting and managing of a patient classification system locally in a hospital or nationally

WORKSHOP OVERVIEW: An efficient national system for collecting admitted patient activity data has several crucial parts managing different aspects of the collection. The workshop will bring the attendees through the different systems, processes, and people involved in the overall collection. The workshop will cover

- Background of coding in Ireland
- The current setup for clinical coding in Ireland
- The training opportunities and requirements for clinical coders
- The data quality work implemented as part of the data collection (including audits)
- Managing coder resources in hospitals
- Communication and collaboration with the system

Specific case studies in training, auditing and other data quality work will be outlined during the workshop.

WORKSHOP OBJECTIVES:

1. Describe the different parts of a national data collection system
2. Outline the components needed at the hospital level
3. Understand how clinical coders are trained and progress through their career

Wednesday 27th September 2022 – Morning

Sustainable HealthCare (Nordcase)

Technology as a door opener - working together for better patient care

Eva Wensaas [a]

No abstract available

[a] Norwegian Directorate of Health, Norway

Sustainable health services and integrated care - from activity to case-mix and activity based funding

Sissel Husøy, Kristin Dahlen [a]

No abstract available

[a] Norwegian Directorate of Health, Norway

Collaboration activities and digital health care – challenges for cost analysis

Ann Lisbeth Sandvik, Jostein Bandlien [a]

No abstract available

[a] Norwegian Directorate of Health, Norway

DRG and the use of digital health care in the Zealand Region

Kristin Hultgren [a]

No abstract available

[a] Region Zealand. Denmark

Casemix and Clinical Coding

An Ontology for ICD11 Chapter 1: Certain Infectious or Parasitic Diseases.

Jean Marie Rodrigues [a], Constant Joseph Kone [b], Théophile Tiffet [a], Béatrice Trombert-Paviot [a]

Semantic interoperability is a crucial point for powering use of medical vocabulary using different healthcare terminologies for the healthcare management and sustainability.

WHO is promoting a new International Classification of Disease version 11 (ICD11) which is based on a semantic framework: semantic categories and textual definitions.

The work done in a PhD dissertation aims to develop an ontology as defined in the semantic web W3C for the ICD11 chapter 1 on "certain infectious or parasitic diseases".

This chapter presents 1027 codes from which we selected 651 by excluding the codes needed only to insure the exclusivity and exhaustivity of any Classification system as ICD: the excluded codes contain the words "other specified" or "unspecified".

The first step is to perform a lexical map between the ICD codes labels and the SNOMED CT concepts labels and in a second step a match of meaning between ICD-11 text definitions and SNOMED CT concept model using EL OWL language. Both terminologies and supporting tools are accessed by their respective web browsers freely available.

The results are for the first step 615 ICD codes (94%) mapped to SNOMED CT by pre-coordination and 36 (6%) by post-coordination.

For the step 2, 490 ICD codes (75%) there is a total representation of the ICD textual definition or codes labels by the present (01/01/2022) SNOMED CT concept model and 161 ICD codes (25%) with a partial representation by the present (01/01/2022) SNOMED CT concept model and a need to use SNOMED CT grammar unvalidated attributes and qualifier values.

The results support the introduction of ICD11 and the SNOMED CT Ontology to make the different healthcare terminologies and medical vocabularies seamless for sustainability and management of healthcare systems.

[a] University Jean Monnet, France
[b] Félix Houphouët-Boigny National Polytchnic Institute, Cote d'Ivoire

Developing 'facility tools' to improve clinical correct coding and settlements at Aarhus University Hospital

Susanne Øllgaard [a], Niklas Munksgaard Berg [a]

Introduction
Clinical correct registration of diagnoses and procedures often have a low priority among clinical staff as it takes valuable time from treating patients. From an economic perspective this is problematic as data plays an important role in the Danish case mix system called DkDRG. DkDRG is used e.g. in comparing productivity between hospitals and to determine settlements between the five Danish regions[1]. Aarhus University Hospital (AUH) settles for more than 100 million euros each year.

Consequently, AUH has developed a set of 'facility tools' to ensure the clinical quality of output data and thereby a more equitable productivity and settlement. This abstract will focus on one of these 'facility tools' concerning correct registration of certain medical treatments.

Methods
The different topics of the 'facility tools' were developed combining specialist knowledge of clinical data input (registration) and output (DRG-grouping and activity) and through a close dialogue with the clinical staff. By analysing DRG-data we discovered low activity in DRG-groups, where the registration of a procedure related to a certain medical treatment were required in order to be

grouped correctly in the DRG-system.

Subsequently we pulled and combined data from two medical systems to locate the patients where the registration of this procedure for the medical treatment was missing. We published the data as a secured list (among the other facility tools) on the intranet of every department of the hospital along with a written guide explaining the why, where and how of the list. All this in order to make it simple for each clinical department to find the relevant patients in the Electronic Health Journal and add to each patient the missing procedure for the specific medical treatment.

Results
The clinical staff received the 'facility tools' with great enthusiasm as the tools were simple and pragmatic to use, and it quickly became a goal to keep the lists empty. Involving the clinical staff from the beginning created an ownership of the task of clinical correct registration and were an important factor in the success of the tools.

Introducing the 'facility tools' to the different departments, improved the registration related to specific medical procedures by far and improved the data quality significantly. Economically this resulted in a significantly higher productivity and increased settlement with other regions.

Conclusions
From the patient's perspective the 'facility tools' improved the clinical documentation and from an economic perspective it improved the hospital productivity and overall economic earnings.

The key points of the success of the 'facility tool' are keeping the tools very simple an illustrative fitting the clinical workflow and involving the clinical staff from the beginning improving their ownership in the process.

References
1. https://sundhedsdatastyrelsen.dk/da/english/health_finance

[a] Aarhus University Hospital, Denmark

Medical coding error: How will it affect the budgeting of the hospital?

Mohamad Helmi Mohamad Yasim [a], Amirah Azzeri [b], Muhammad Khairul Asraf Shah Nizamuddin [c], Mohd Hafiz Jaafar [b], Maznah Dahlui [a]

Introduction
Medical coding error happens when the codes assigned by the coders are different from the actual diagnosis and procedures conducted on the patients. These error leads to wrong case-mix codes and finally caused negative implications to the estimations of the hospital's workload, budget and income. This study aimed to estimate the magnitude of error in medical coding in the largest teaching hospital in Malaysia.

Methods
40,839 hospital admission data at University Malaya Medical Centre (UMMC) in 2020 were obtained from the electronic medical record (EMR). The data consists of various medical disciplines in the center. Before the implementation of the case-mix at UMMC in 2021, only data on ICD-10 was available in the EMR. Those ICD-10 data were coded by the treating clinicians. Quality checks on the ICD-10 codes were done by the experts to ensure that the diagnosis codes were correct. On the

other hand, the clinical procedures were all not coded and in a form of free text. Therefore, several trained coders had to do the ICD9-CM coding. After both the ICD-10 and ICD9-CM codes for every admission were documented, the data were imported into a case-mix grouper. The grouper then generated the Diagnosis Related Group (DRG) codes for all the treatment episodes at UMMC. The magnitude of errors was determined and presented in the form of frequencies and percentages. Subsequently, factors influencing the coding errors were investigated through observations and explorative study.

Results
The initial ICD-10 quality check found that 60% of the codes were correct. The remaining 40% error in ICD-10 codes was mainly about the secondary diagnoses, either they were un-coded or wrongly coded. Regarding the DRG codes, 5236 (13%) errors were found after DRG data were generated from the grouper. There are divided into three main categories of error. 3084 (7.7%) errors of 'no DRG' assigned. This happened when the combination of socio-demographics of the patients, diagnosis and procedures did not correspond. 1300 (3.2%) errors were due to the wrong parenteral codes used in the primary diagnosis such as codes with asterisks. The remaining 852 (2.1%) errors were due to invalid birth weight for infant cases, invalid date of admission, wrong gender, particularly in the obstetrics and gynecology cases and incomplete principle diagnosis for deliveries in obstetrics cases. Based on the observations, factors associated with the medical coding error were incomplete discharge summaries specifically on the primary and secondary diagnosis, typo error on the socio-demographic characteristics of patients and lack of experience to choose appropriate codes by the healthcare workers.

Conclusions
The quality of medical coding is important, especially in a healthcare setting that implemented case-mix as the medium of quality assessment and budget allocations. The medical coding errors will lead to inaccurate hospital tariffs and could result in inefficient allocation of healthcare resources and significant potential loss of revenue to the hospital, which will resonate in the poor healthcare service deliveries. The implication of medical coding error to the budgeting of the hospital should never be underestimated. Close monitoring of the quality of discharge summaries and proper training on coding for healthcare workers is crucial to minimize the error.

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[c] University of Malaya, Malaysia

The disease burden of cardiac in-patient cases in 2020 according to My-DRG code at a teaching hospital

Muhammad Khairul Asraf Shah Nizamuddin [a], Amirah Azzeri [b], Mohamad Helmi Mohamad Yasim [c], Imran Zainal Abidin [c], Maznah Dahlui [c]

Introduction
Global Burden Disease Study in 2017 stated that Non-communicable Diseases, which cardiovascular disease makes up the largest portion, were accounted for 73.4% of death. Similarly in Malaysian Government Hospital, cardiovascular diseases were among the top 10 diseases for several years. This study aims to establish the most common cardiac in-patient cases according to My-DRG classification at one of the teaching hospitals in Malaysia as to understand the disease burden of cardiac cases and efficient future management.

Methods
Retrospective data from electronic medical record for cardiac admission in 2020 were obtained. Information related to admission such as primary data and secondary diagnosis and free text procedures were extracted. The data was coded by trained coders which combine both ICD-10 for the diagnosis and ICD9-CM for the procedures and imported into a case-mix grouper to generate the DRG codes. The final data was sorted according to the severity based on Malaysia Diagnosis-Related Group (My-DRG) and ICD-10.

Results
A total of 3337 in-patient cardiac cases were treated at the hospital in 2020. The top five DRGs for cardiac cases were Angina Pectoris & Chest Pain - mild (I-4-20-I) (n = 408 (12.2%)), Other Factors Influencing Health Status - Mild (Z-4-12-I) (n = 334 (10%)), and Other Factors Influencing Health Status - Moderate (Z-4-12-II) (n = 271 (8.1%)), Angina Pectoris & Chest Pain - Moderate (I-4-20-II) (n = 204 (6.1%)), and Acute Myocardial Infarction - Mild (Mild) (n = 194 (5.8%)). Among the total cases, there were 1554 mild cases, 1865 moderate cases, and 632 severe cases. For the mild cases, the most common DRG was Angina Pectoris & Chest Pain - Mild (I-4-20-I) (n = 408 (26.3%)). The mean Average Length of Stay (ALOS) was 3.97 days. The range of LOS = 1 - 368 days. The mean age = 61.72 years old (Range: 0 - 96). The male patients were 994 (64%) and the female patients were 560 (36%). For the moderate cases, the most common DRG was Angina Pectoris & Chest Pain - Moderate (I-4-20-II) (n = 337 (18.1%)). The mean ALOS was 6.02 days. The range of LOS = 1 - 371 days, mean age = 64.87 years old (Range = 22 - 93). The male patients were 1081 (58%) and the female patients were 784 (42%). For the severe cases, the most common DRG was Other Factors Influencing Health Status - Severe (n = 105 (16.6%)). The mean ALOS was 9.22 days. The range of LOS = 0 - 95 days, mean age = 64 years old (Range = 0 - 95). The male patients were 407 (64.4%) and the female patients were 225 (35.6%).

Conclusions
In conclusion, although there was mixture of different severity cases in 2020, cardiac admissions did not reflect the status of a teaching hospital. Majority of the cases were mild cases. As a tertiary hospital, attention to mild cases showed that the resources were not utilised efficiently. Hence, this study can be used to inform the hospital staffs on the importance of admitting suitable cases that will reflect the status of the hospital.

[a] University of Malaya, Malaysia
[b] University Sains Islam Malaysia, Malaysia
[c] University Malaya Medical Centre, Malaysia

Funding (1)

Using case mix adjustment to devise a fairer resource allocation formula in UK primary care.

David Shepherd [a], Alan Thompson [b], James Barrett [c], Stephen Sutch [d]

Introduction

The principal proposition is to distribute funding for primary care in a way that more closely matches the needs of the population, with the aim of reducing health inequity in outcome.

The current national funding formula, is not felt to match resource to need as well as it should. This is because it uses practice (not patient) level data is not case mix adjusted, does not include certain factors known to affect primary care workload, and uses problematic and outdated workload estimates.

The intention was to develop a flexible, local formula, based on local data that was responsive to changes in need, that enabled simplification of payment mechanisms.

Methods

The principles guiding this work are:

- to use whole population, patient level data to capture the granularity that occurs due to the size of our service providers
- to use the data to determine both the parameters of model and its inputs
- to use an analytic program capable of handling both the breadth of clinical scenarios and their complexity (ACG)
- to adjust the dataset for missing data (to remove the distortions that missing data forces on the case mix system).

The basic funding model structure consists of a Core funding component and a Needs based component, comprising needs and deprivation elements.

The weights needed for the case mix calculations were derived using local primary care activity data matched to the case mix cells. They were applied to each provider's estimated case mix after adjustment for coding deficit, to calculate the case mix adjusted expected activity.

Results

The output was a relative coding, case mix, turnover and communications adjusted expected provider activity which was used as a proxy for need to distribute the funding deemed in the scope of the project.

On a population base of 1.16m patients, the model was used to allocate £114.6m between 130 primary care providers. The core funding made up 42%, the case mix needs component 52% and the deprivation 6%.

The model led to increases in funding attributable to the new funding model for 76 primary care providers totalling £2.8m, whom the model had determined had been under-resourced compared to peers under existing funding arrangements.

Discussion

The arrival of NHS big data, a tool such as ACG powerful enough to handle the complexity, combined

with the analytics needed to adjust for the effects of data deficit were three of the keys to success. However, without the additional support from the head of finance and the ICS, this project could not have succeeded. Additionally, much time was spent engaging with providers and local stakeholders to secure agreement, as this was outside the national funding settlement. Transparency and having an objectively testable value-driven approach were also essential.

Early indications are that the funding redistribution is having an effect on local staff retention and recruitment in traditionally difficult areas.

An outcomes framework that has been put in place to measure changes going forward.

[a] NHS Leicester City CCG, United Kingdom
[b] Johns Hopkins Healthcare LLC, United Kingdom
[c] Johns Hopkins HealthCare, Baltimore, Maryland, United States
[d] Johns Hopkins University, Netherlands

Activity Based Funding Implementation Plan 2021-2023 - Progress in a COVID environment

Brian Donovan [a]

Introduction
Following the worldwide pandemic and its impact on Ireland's health service, the Healthcare Pricing Office (HPO) has published publish 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, when implemented, will represent 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 implementation plan follows on from the first plan created with the formation of the HPO in 2015 and aims to further advance ABF in Ireland.

This presentation will outline the main areas of the plan and demonstrate the significant progress to date notwithstanding the impact of the pandemic on both ABF in Ireland and the work of the HPO.

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. The presentations will consider the work to date and identify the challenges so far, with the aim of identifying the focus for the remainder of the plan.

Results
While the plan has been recently published, it has been in preparation during the COVID period and so work on the objectives has commenced in parallel. COVID-19 has demonstrated the significant capacity of the health system to respond effectively to the need for rapid change and improvement The presentation will show the substantial progress made by the HPO to date on the plan despite the competing pandemic response requirements on HPO resources.

Conclusions
The Implementation Plan signals a shift from the necessary foundational and technical work around the costing and pricing of services towards creating a more holistic healthcare resourcing and purchasing process that links insights from key clinical, operational and patient stakeholders, with the core Sláintecare intent around integrated care, in the least complex setting appropriate, as close to home as practical.

[a] Healthcare Pricing Office, Ireland

New features for the French Hospital Financial Incentive for Quality Improvement program (IFAQ)

Marie-Caroline Clement [a], Florent Monier [a], Clément Rallet [a], Joëlle Dubois [a], Véronique Sauvadet-Chouvy [a]

Introduction
The hospital Financial Incentive for Quality Improvement program (IFAQ) has been launched in France in 2012 by the Ministry of Health and extended to all hospitals for acute care and home care in 2016 and for rehabilitation care in 2017. In 2018, France initiated the National Strategy for Healthcare System Change, which strengthened its Pay-For-Performance mechanisms. Under it, the amount dedicated to IFAQ will increase from €50M in 2018 to €1 billion in 2023 and the model will be extended to psychiatric hospitals.

Furthermore, IFAQ has been rebuilt. The France's Technical Agency for Information on Hospital Care (ATIH) under the direction of the Ministry of Health is overseeing the development and the implementation of the "new IFAQ". The purpose of this presentation is to outline the new features of IFAQ that have been implemented since 2019.

Methods
The main new features of the new IFAQ are (i) pay per indicator, (ii) dual integration of outcomes (level achieved and improvement) and (iii) model stratification by comparison group (CG).

Indicators are annually selected by the Ministry of Health as part of categories fixed by law such as Quality of care as perceived by patients or Quality of clinical care.

CG have been built to contain hospitals with similar activity (number of inpatient stays crossed with the degree of specialization).

For each indicator, a target level is defined independently from CG. In addition, a threshold for remuneration is determined per CG based on the outcome of the top 70% hospitals.

Per hospital and per indicator, the level of remuneration will be:

- Outcome equal or above the target level: 100%
- Outcome between the threshold of remuneration and the target level: 50% based on the distance to reach the target level + 50% based on the improvement over last year.
- Outcome below the threshold of remuneration: 50% based on the improvement over last year.

An overall level of remuneration is calculated for each hospital and the credits are allocated to them per CG, according to the economic volume they produced and how they performed on the indicators.

Results
New IFAQ has been implemented for 3 years now. It has been strongly impacted by Covid-19 pandemic as the collection of most indicators was suspended in 2020 and the economic volume of the hospitals was differently impacted depending on the CG.

Limitations of this model have been identified for the outcomes' integration of indicators based on automatic calculation from medico-administrative databases. Indeed, generally, these indicators need to be adjusted. The adjustment is then questioning (i) the interest of a stratification per CG and (ii) the method to determine the threshold of remuneration based on hospitals' outcomes by CG instead of on the deviation from the expected outcome estimated specifically per hospital based on its activity and patients' characteristics. An example will be displayed.

Conclusions
The new IFAQ is still adjusting and is being appropriated by hospitals. In the coming years, the Ministry of Health should anticipate the choice of indicators used for IFAQ to let time to hospitals to implement actions to improve their outcomes. In addition, ATIH will need to develop new indicators issued from medico-administrative databases and develop statistical methods to improve their use for the IFAQ program.

[a] ATIH, France

The extension of the hospital Financial Incentive for Quality Improvement program (IFAQ) to psychiatric hospitals in France.

Steve Briand [a], Marie-Caroline Clement [a], Anis Ellini [a], Robin Louvel [a], Florent Monier [a], Clément Rallet [a], Pauline Renaud [a], Véronique Sauvadet-Chouvy [a], Joëlle Dubois [a]

Introduction
As part of the Ma Santé 2022 program, the funding model for French psychiatric hospitals has been reformed. The new funding model is being phased in since January 1, 2022. It is based on 8 allocations, including one based on population, one on activity, and one on quality.

The psychiatric quality-based allocation will be part of the hospital Financial Incentive for Quality Improvement program (IFAQ). In this perspective, quality indicators and hospital comparison groups (CG) were needed. Some indicators developed by the High Health Authority (HAS), common to all hospitals or specific to psychiatry, were available but not sufficient and CG did not exist. For this reason, the France's Technical Agency for Information on Hospital Care (ATIH) started work on

constructing CG and developing new indicators for psychiatry from the medical administrative databases.

Methods
Work used a co-construction method with health professionals and stakeholders. Their input helped to guide the work in selecting patient, hospital or territorial characteristics that have an impact on psychiatric care.

CG were constructed to group hospitals with similarities based on care delivered and patients managed.

Two indicators were selected with health professionals and stakeholders for their importance as a burden in psychiatric care in France: (i) Long-term hospitalization rate (=90 days) and (ii) 15 days post-discharge follow-up rate. The temporal thresholds were negotiated between the Ministry of Health and health professional to reach a consensus to concern most hospitals and to be in line with good practice.

Their calculation uses two medical administrative databases: the medicalized collection of information in psychiatry (RIM-P) and the inter-scheme consumption data. Outcomes were adjusted for Long-term hospitalization rate. Variables introduced into the model, based on patients' and territories' characteristics, were chosen in agreement with the health professionals.

Results
At the end, five CG were validated. They are based on the number of patients cared for in the year, the hospital's authorization for non-consensual care and the type of care (full-time/part-time inpatient or outpatient care). The number of hospitals per group ranges from 62 to 216 regardless of legal status. CG are used to stratify the results.

The two indicators developed by ATIH have also been validated. The 15 days post-discharge follow-up rate was 55% on average per hospital; it was lower for children than for adults. This disparity will be considered by stratification.

The adjusted rate of Long-term hospitalization was analyzed through a funnel plot. Based on a 95% confidence interval, the results show that approximately 30% of hospitals are above the upper limit of the interval.

The limit of the confidence interval to consider will be discussed with health professionals and the Ministry of Health.

ATIH Indicators will be used, in addition to the HAS, in IFAQ for psychiatry.

Conclusions
IFAQ for psychiatry will be tested in 2022 based on 2021 data. 2022 will be a blank year as the allocation will be based on historical regardless of the outcome of the quality indicators. The quality allocation will be implemented in earnest starting in 2023. Nevertheless, this first year will be a challenge for hospitals.

[a] ATIH, France

Classification Development (1)

Casemix in aged care: creating the foundations for much-needed reform

Kathy Eagar [a], Rob Gordon [a], Conrad Kobel [a], Carol Loggie [a]

Introduction

A new casemix-based classification and funding system for residential aged care is planned for implementation by the Australian Government in October 2022, bringing a significant overhaul of the current system. In addition to changes to the funding arrangements, new national staffing requirements have also been informed by the classification.

The Australian National Aged Care Classification (AN-ACC) was developed in a national study commissioned by the Commonwealth Department of Health.

Methods

The project comprised four studies, conducted over 18 months:

- Service utilisation and classification development study - captured individual care time per resident per day, along with resident assessment data and financial data, designed to provide information about the costs of delivering care to residents with different care needs (the 'variable' costs).
- Structural and individual cost study - involved collecting financial data to identify facility characteristics, such as location, size and specialisation, that drive the care costs shared equally by all residents (the 'fixed' costs).
- National casemix profiling study - undertaken using a draft classification and payment model that was developed from the findings of the first two studies.
- Reassessment study - involved reassessing residents four to six months after their initial assessment, to collect additional information about the rate and extent of change in residents' care needs over time.

Results

The AN-ACC funding model consists of three components: a variable payment (for the individual care component), a base care tariff (for the fixed care component), and a one-off adjustment payment for the additional resources required when a resident first enters residential care.

Residents are assigned to a casemix class using an AN-ACC assessment tool, and this class determines the 'variable' per diem payment for each resident. The AN-ACC classification comprises 13 classes, which are defined based on end-of-life needs, frailty, functional status, cognition, behaviour and technical nursing needs. There is a fivefold difference in relative cost between the least and most expensive class.

The base care tariffs for the 'fixed' costs of providing care to all residents were derived from multivariate modelling of the financial data. Analysis identified that the cost drivers at facility-level were remoteness, size, low bed occupancy, and indigenous and homelessness service specialisations.

The national casemix profiling, incorporating population projections, showed there would be some funding impacts in parts of the sector, however, the impact would be neutral for most care homes.

Conclusions
As the population continues to become older and frailer with increasingly complex care needs, more sophisticated information systems are needed in the aged care sector to better inform funders, providers and the community, and ensure service sustainability.

The AN-ACC was selected by government as a preferred funding model as it provides a meaningful system for addressing critical issues around aged care quality, including more transparent and equitable funding, appropriate staffing requirements, and the benchmarking of outcomes. Additionally, the model has the potential to be progressively expanded to also include community and home aged care services.

[a] Australian Health Services Research Institute, University of Wollongong, Australia

Development of Oral Health Casemix System - An Innovation for Quality and Efficiency of Oral Health Care Services in Malaysia

Rosminah Mohamed [a], Syed Mohamed Aljunid Syed Junid [b]

The Casemix System currently implemented in many developed and developing countries, were heavily catered on medical condition, and lacking dental cases, which are equally important to be classified and emphasized at the hospital level. Therefore, the Oral Health Casemix System (OHCS) was developed in Hospital USM, funded through the Vice Chancellor Special Fund to support the mission of an APEX university programme in USM. It is a novel innovation specifically to cater for dental and oral care cases in Malaysia. This prestigious pilot project, highlighted by a collaboration with the International Centre for Casemix and Clinical Coding-UKM (ITCC-UKM. Selection of MY-DRG(r), which is based on MY-DRG(r) main Grouper is justified based on the universal and dynamic functions of this Grouper that caters for various severity levels and can capture the various stages of a particular health condition covering Acute (in-patient and outpatient), sub-acute (moderately complex cases) as well as Chronic Case (long stay cases) patients. The development of OHCS was conducted from 2016 till 2018 involved two phases; collection of dental patient-level data and development plus customization of the software based on the Software Development Life Cycle (SDLC), conducted by experts from both varsities. A total of 50,070 dental cases was captured from both facilities. Based on these patient-level data collected from dental facilities in both Hospital USM and UKMMC, OHCS softwares were developed; the, OH-MY-CBG Grouper, DataTool Pro, Code Assist and Clinical Costing Modelling (CCM) for USM and UKM. As a result from a vigorous process, the team managed to develop the required OHCS based on the MY-DRG(r) Grouper that would benefit the Malaysian health system. Upon classification with MY-DRG(r) Grouper, a total of 10 Case Major Groups (CMGs), where ach CMG contains many different Case Base Groups (CBGs); 36 inpatient CBG (Inpatient Split) and 34 outpatient CBGs (Outpatient Split). The inpatient CBGs alone by taking consideration of the severity level presented a total of 935 groups of CBGs. Costing was carried out using step-down costing at patient level that involving overhead, intermediate, and final cost-centres. The Unit Cost, Cost Weight, Casemix Index (CMI) were subsequently calculated based on the patient level costs. The tariff are developed for dental cases from these cost weights adjusted with the clinical severity of the cases CMI. For the conclusion, both health care facilities (USM and UKM) owned an exclusive dental tariff, which can be used as referral for the hospital management to improve efficiency and increase quality of dental care in Malaysia. And perhaps, hospital benchmarking in the future. The challenge for us was to introduce the knowledge and develop the

core capacity of the Casemix System to our health care providers in Malaysia.

[a] Universiti Sains Malaysia, Malaysia
[b] Universiti Kebangsaan Malaysia, Malaysia

A casemix classification for ambulance services

Deniza Mazevska [a], Jim Pearse [a], Matthew Bell [a], Joe Sakhaei Sakhaei [a], Susan Dunn [b], Peter Payne [c]

Even in countries with a long history using casemix, ambulance services tend to be block-funded. With the rising demand and costs of ambulance services, there is a need to develop approaches that capture the complexity of patients using ambulance services and reflect this in funding. This paper will report on the initial phase of this work: an analysis of cost drivers of ambulance services to develop a casemix classification.

Data from an ambulance service for a state within Australia were obtained from the service's computer-aided dispatch system, electronic medical records, patient health care records and aeromedical service were provided for 4 years (2017-18 to 2020-21), for a longitudinal view of ambulance activity and to smooth fluctuations due to COVID-19.

Process mapping and workshops were undertaken first, to understand the services. Through this, 5 product streams were defined:

1. Emergency episodes, road ambulance
2. Other episodes, road ambulance
3. Aeromedical
4. Events
5. Other services

An episode of care was defined as the unit of count for streams 1 and 2, combining all activity relating to an incident (e.g. multiple ambulances arriving at the scene) into an episode to reflect the resource intensity of incidents using multiple resources. Although it was considered desirable to integrate air ambulances and road ambulances relating to a specific incident, data systems currently do not do this routinely. Therefore, aeromedical was defined as a separate stream with separate products. The unit of count was defined as a "flight", reflecting that more than one patient can be retrieved by a single flight. This will be revisited when road ambulance and aeromedical data are integrated in the near future.

Following the above, for stream 1, the quantitative data were used to develop classes based on resource use while maintaining clinical and business relevance. The products identified for stream 1 were:

1. Call only
2. Dispatch but no treatment
3. Dispatch and treat
4. Dispatch, treat, retrieve

The variables explored for creating classes were:

1. Dispatch priority level assigned in the call taking process.
2. Nature of the problem identified by the call taker.
3. Clinical protocol/s implemented by the on-scene clinicians.

Markers of resource use analysed were:

1. Episode duration.
2. The mean number of vehicles used per episode.
3. The mean number of intensive care paramedics.

Due to the infrequency of episodes where other specialised skillsets are required (e.g. special casualty access), these were not analysed at this stage.

Dispatch priority levels showed difference in resource use amongst episodes, while the nature of problem and clinical protocol did not. Therefore, for stream 1, classes based on priority levels were created for products 3 (Dispatch and treat) and 4 (Dispatch, treat, retrieve).
This project will be followed by a costing study to finalise the classification.

The expansion of casemix to non-traditional areas such as ambulance services is recognition of the benefits that casemix can have for matching funding to complexity and encouraging innovations to manage demand and costs.

[a] Health Policy Analysis, Australia
[b] Activity Based Management, NSW Health, Australia
[c] NSW Ambulance, Australia

Enhancements to the Emergency Visits component of Comprehensive Ambulatory Classification System (CACS) methodology.

Koffi Kpelitse [a], Tina Li [a], Yvonne Rosehart [a]

Introduction
The Canadian Institute for Health Information (CIHI) is responsible for developing and maintaining the Comprehensive Ambulatory Classification System (CACS) methodology, which is a national grouping methodology for ambulatory care patients treated in emergency departments (ED), out-patient clinics and same day surgery. Patients are grouped based on their clinical characteristics and resource utilization. CIHI is currently reviewing the ED component of the CACS methodology, looking for opportunities to better reflect ED complexity and associated resource utilization, both in how cases are assigned to CACS cells and in the calculation of Resource Intensity Weights (RIWs).

Methods
CIHI reviewed the current logic for assignment of ED visits and are exploring alternative ways to assign some specific patient groups (e.g., patients that are admitted or patients with interventions) and incorporate additional grouping variables. CIHI is also reviewing the labels used to define CACS cells to ensure they are intuitive for ED clinicians and representative of the patient groups they treat. For the RIW derivation, in contrast with the current approach where the RIW values for ED cases are derived from a general model for all the ambulatory care patient population, CIHI has developed an ED-specific RIW model. Various iterations of the model were tested using age groups and indicators for anesthetic technique and investigative technology as adjustment factors. We are also testing additional factors in the model to improve the overall performance of the model and better capture ED complexity.

Results
CIHI is working with a panel of ED clinicians to test ED-specific RIW regression models for CACS. Based on preliminary findings, creating an ED-specific model, exclusive of any other modifications

did not significantly impact the overall model performance for ED patients. To this end, CIHI is expanding the regression models to incorporate additional variables and is testing modifications to the overall logic to better address ED complexity for certain patient cohorts (e.g. those admitted and those receiving moderate and high-cost interventions). An evaluation of the various options and the recommended final model will be discussed in the presentation.

Conclusions

Ensuring the CACS grouper best reflects ED complexity and resource utilization is of critical importance. Improving the overall performance of this model and creating setting-specific models within CACS, will provide healthcare facilities and policy makers with better information to help them monitor and improve the care and services provided.

[a] Canadian Institute for Health Information, Canada

Wednesday 27th September 2022 – Afternoon

Costing and Development (Nordcase)

Defining the Nursing Cost per Patient's Care Day Price

Sanna Kautto [a]

No abstract available

[a] FCG Finnish Consulting Group Oy, Finland

Costing data for primary care

Jan Sölch, Mikael Havasi [a]*, Ralph Dahlgren* [b]

No abstract available

[a] Swedish Association of Local Authorities and Regions, Sweden
[b] National Board of Health and Welfare, Sweden

Development of the payment model

Malle Avarsoo [a]

No abstract available

[a] Estonian Health Insurance Fund, Estonia

NordDRG - Developing grouping logic for psychiatric care

Lotta Sokka [a]

Introduction
Psychiatry, as a field of medicine, is very complex, and psychiatric illnesses, their symptoms as well as diagnostic and treatment options are often multidimensional. So far, the NordDRG grouper has not been able to produce information on the level the field of psychiatry would need. This is due to the fact, that grouping variables used by the grouper in psychiatry field have been limited mainly to diagnoses information and some patient and care characteristics, which have not been sufficient to create clinically and economically meaningful groups. The mental health and addiction related intervention classification, which was introduced into national classification of interventions in 2018, created a good opportunity to revise the current grouping logic in this area.

Methods
The aim of the project is to update the grouping logic for psychiatric diseases and disorders in such way, that it will fulfill both clinical and economical needs of the psychiatric field. The organization responsible for the project is Finnish Consulting Group, and it is implemented in cooperation with Nordic Casemix Centre (NCC), Finnish institute of national health and welfare and several national hospital districts. The data used in analyses is from five Finnish university hospitals. No additional data was collected for the development work.

NordDRG grouping starts with the patient's main diagnosis, on basis of which a certain MDC (Major Diagnostic Category) is assigned for each case. The MDC for psychiatry is 19 (Mental diseases and disorders). Within MDC, the cases are assigned into more specific diagnosis categories. A diagnosis category is a group of clinically similar diagnoses. In the updated grouping logic not only the main

diagnosis, but also possible complicating secondary diagnoses and procedures, both psychiatric and others, performed are taken into account. In some cases, patient's age may affect the care of a certain illness and the costs involved. This is also being considered while updating the logic. The development work is an iterative process including continuous testing and iteration of the grouping rules.

Results and Conclusions
In 2022, the development work is still ongoing. The new psychiatric grouper should be ready and tested by the end of the year 2022, and available for use in 2024 national grouper version.

[a] FCG Finnish Consulting Group Oy, Finland

Casemix Within Countries

Another step forward in the Slovenian DRG System

Martina Zorko Kodelja [a]

Introduction
At the PCSI conference in Copenhagen in 2019, a project for the calculation of new DRG weights based on actual Slovenian costs (National Cost Analysis - NCA) was presented. At that time, we ended the presentation with the question/challenge, how to implement these new weights? And we are still dealing with the same challenge today.

Methods
The DRG weights calculated in 2019 on the basis of actual costs in Slovene hospitals were quite different from the old "Australian" weights we have been using since 2004, since the DRG system was introduced. The new "Slovenian" weights would represent a significant change in hospital revenues. Eg our largest hospital would lose about EUR 6 million (3% of its budget). Other hospitals, however, would gain or lose differently. Therefore, despite the planned additional funds to prevent a reduction in funding for hospitals, the partners in Slovene healthcare system did not support the implementation of new weights.

At this point, the Health Insurance Institute of Slovenia (HIIS), as the payer of hospital services, launched a new, broader project "Establishment of comprehensive management of the DRG system". The purpose of this project, in cooperation with other stakeholders, is to define, establish, test and introduce infrastructure and procedures that will enable comprehensive long-term management of the DRG system, including its development and upgrades. Namely, the DRG system needs continuous maintenance (eg clarification and supplementation of coding rules), regular updating (eg introduction of new DRG and other classifications) and recalculation of weights based on actual cost data from hospitals.

Results
The project is in the middle of implementation, so let me focus on what has already been done.

In cooperation with hospitals, we finalized the methodology for recording costs in hospitals and transmitting this data to the HIIS. The basis of the methodology was already laid at the NCA, and now we have supplemented it with additional cost categories. The goal is that hospitals record as

many costs as possible directly to the individual patient. Therefore, with the representatives of 11 hospitals, their economists and analysts, we carefully reviewed the current state of recording costs in hospitals and examined the possibilities for upgrading it. We wanted the result to be the highest quality data with as little extra work as possible and uniform across all hospitals. This year, HIIS will allocate an additional EUR 2.2 million to hospitals to improve the cost recording system.

Another area in which we are systematically working more is the involvement of all stakeholders in the project to ensure their support/cooperation and acceptability of project results. We have established a project council, which consists of representatives of all stakeholders in Slovenian healthcare and supervises the project and approves project results. In addition, we meet monthly with representatives of the Ministry of Health and the Public Health Institute to regularly coordinate activities regarding the introduction of a new version of the AR-DRG system. We regularly promote the project at national conferences, and in May 2022 we will organize a "DRG conference", the purpose of which is to unite all stakeholders on the need to modernize the DRG system.

Conclusions
We still have a lot of work to do. The project has been running since the end of 2020, in the meantime it has been somewhat slowed down by the epidemic. In addition, we decided that we should first update the version of AR-DRG, and only then collect data on costs and (re)calculate new weights. I hope that our efforts will ensure sufficient support from all stakeholders, so that this time implementation of new weights will be successful, and that we will be able to establish a system that will allow periodic repetition of these steps - hopefully I can report on this on one of the next PCSI conferences.

[a] Zavod za zdravstveno zavarovanje Slovenije / Health Insurance Institute of Slovenia, Slovenia

Implementation of a Patient Level Costing System and Ancillary Services in the Province of Quebec

Christian Pepin [a], André Loiselle [a], Marc Hyndman [a], Charles Cockburn [a], Serge Boulard [a]

Introduction
In 2012-2013, the Province of Quebec (Canada) started investigating ways in which it could make changes to the funding of its Public Health and Social Services network, including the introduction of patient-based funding. A prerequisite for this transformation was a developed understanding of the cost of providing healthcare services across different settings.

As a result, PowerHealth Solutions was awarded a 3-year contract to implement its Patient Level Costing solution. PowerPerformance Manager (PPM), in 31 Health and Social Services health networks across Quebec in May 2017.

The implementation was far more than just the introduction of Patient Level Costing encompassing data integration and the development of over 1,800 interfaces, the development of a standardised Costing methodology, the provision of Lean Six Sigma Green and Black Belt Training, clinical engagement, data analysis, the development of a centralised reporting database for the Ministry of Health and Social Services and a Comparative Portal so that each establishment can easily compare its performance to others.

Methods
The steps and major elements of this wide-ranging project are listed below. The tasks mainly took place in parallel following the completion of project initiation tasks. Each portion can influence the other in an agile method:

- Quebec Project context and objectives
- Project Governance
    - Governance structure
    - Finance, data normalization and Methodology committees
- Integration and Normalization of Clinical and Financial Data
    - State-wide clinical system inventory
    - Standard views,
- Implementation of the solution throughout the Public Health and Social Services Network (PHSSN)
    - Approach
    - Formation of a team (in the PHSSN) providing customer support
- Cost results, activities, and case-mix analysis:
    - Development of support packages
    - Design of an analysis tool
- Submitting Data to the Ministry:
    - Costing results, raw finance data and methodologies
- Centralized auditing capacity:
    - Provincial Cost Database and Portal
    - Provincial Financial and Methodological Database

Results
This Project was completed in accordance with the planned time frames and within the budget due to an effective and flexible project management approach, which provided feedback and learning for use in other similar implementations.

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.

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

The local availability of data and the presence of the portal allows the establishments to assess the effectiveness and efficiency of care trajectories and to challenge their costs.

Conclusions
This project demonstrates that, even starting from a lack of costing history in a province of 8 million inhabitants served by a significant number of very diverse facilities, it is possible in only three years to establish an infrastructure that provides the Quebec Ministry of Health and Social Services and establishments with data that will allow them to make informed changes to the health system in the future. Such an approach provides a catalyst for changes in clinical practice.

[a] PowerHealth Solutions, Canada

COVID-19 and Diagnosis Related Group In An Asian Middle-Income Country: Patient classifications and associated hospital costs

Amirah Azzeri [a], Mohamad Helmi Mohamad Yasim [b], Muhammad Khairul Asraf Shah Nizamuddin [c], Mohd Hafiz Jaafar [a], Maznah Dahlui [b], Awang Bulgiba [c], Mohmmad Salleh Yahya [b], Nazirah Hasnan [b], Nadia Samsudin [c], Sharifah Faridah Syed Omar [c]

Introduction

COVID-19 pandemic impacted healthcare systems in many aspects, with the most immediate need being the increased healthcare burden and the increased demand for healthcare resources including personnel, clinical consumables and medical facilities. Limited data is available on the estimation of the economic implications associated with the COVID-19 admissions in Malaysia. This study aimed to determine the distribution of Diagnosis-Related Group (DRG) and the associated costs among patients admitted to one of the teaching hospitals in Malaysia to understand the magnitude of economic implications related to the pandemic.

Methods

Data on hospital admissions in 2021 were obtained from the electronic medical record. Admissions related to COVID-19, either as a primary diagnosis or secondary diagnosis was extracted and the data was coded by trained coders, with ICD-10 for the diagnosis and ICD9-CM for the procedures. The combination of ICD-10 and ICD9-CM codes were imported into a case-mix grouper to generate the DRG codes. The DRG codes used for COVID-19 were A-4-13-I, A-4-13-II and A-4-13-III for mild, moderate and severe classification respectively. Simultaneously, clinical pathways for the three DRGs were collected from experts. Following the clinical care pathways obtained, healthcare resource utilisation was estimated by combining top-down and bottom-up costing approaches when necessary. Available unit cost data from the Ministry of Health and published articles were used whenever relevant. Discounting and inflation of cost data was based on local guidelines and official rates. The distribution of COVID-19 patients based on DRG was presented as frequencies and percentages while cost data were reported in US$, the price year 2021.

Results

A total of 4889 patients with COVID-19 diagnosis were admitted to the hospital in 2021. Of that, 4813/4889 (98%) had a primary diagnosis of COVID-19. The remaining 76/4889 (2%) patients were admitted for other medical reasons, however, was found to be positive during the admission. Therefore, for those patients, COVID-19 infection was considered the secondary diagnosis during the treatment episode. Among the 4813 patients, 3909 (81%) were admitted with mild COVID-19 (A-4-13-I), 630 (13%) had moderate COVID-19 (A-4-13-II) and the remaining 274 (6%) were admitted for severe COVID-19 (A-4-13-III). More than half of patients with COVID-19 as the secondary diagnosis (56%) were admitted for cardiac catheterisation and other elective procedures. The average length of stay (ALOS) for mild COVID-19 (A-4-13-I) was 9 days and the cumulative hospital costs were estimated to be USD 1,543. The ALOS for both moderate COVID-19(A-4-13-II) and severe COVID-19(A-4-13-III) was 21 days and the cumulative hospital costs were estimated at USD 23,527 and USD 26,731 respectively. The total costs incurred by the hospital for 2021 for COVID-19 were estimated to be USD 19,259,153.

Conclusions
In conclusion, COVID-19 resulted in significant economic implications to the healthcare system. This study provides local data and assessment of the economic burden of Covid-19 infection in Malaysia. The findings of this study can be used to inform the Government's policies on preparedness for future outbreaks and the efficient allocation of healthcare resources.

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[b] University Malaya Medical Centre, Malaysia
[c] University of Malaya, Malaysia

The HIPE Review - a Happy 50th Birthday for HIPE

Sinead O'Hara [a], Deirdre Murphy [a], Brian McCarthy [a]

Introduction
The Hospital In-Patient Enquiry (HIPE) data scheme collects patient activity data on all admitted patients in public hospitals in Ireland. HIPE recently passed its 50th year in existence and it continues to be a significant source of timely and accurate quality health data. As part of the Activity Based Funding implementation plan, the Healthcare Pricing Office undertook a review of HIPE to determine how HIPE can be developed to meet the challenges of a changing and increasingly wide-ranging healthcare system moving away from solely hospital-based care.

Methods
The review progressed via a series of stages beginning with a review of HPE outlining the current process and challenges nationally and at a hospital level. Stakeholders in the area were identified based on whether they maintain HIPE records or use HIPE data, and a survey was circulated. The outcome of the survey was further distilled via focus groups and one-to-one meetings with key stakeholders. The final deliverable of this work was a HIPE strategy showing a path for HIPE into the future.

Results
The presentation will examine the feedback received from the survey, focus groups and other meetings and show how the strategy has been shaped by this input. The key points of the strategy will also be presented.

Conclusions
Through changes in patient care, models of healthcare delivery, classification, technology and health policy HIPE has remained the national collection system for acute hospital activity for more than 50 years in Ireland. Its ability to adapt and move on is a testament to the resilience and commitment of the staff who have worked on it over this time in hospitals and at a national level. The statement of purpose and strategy provides a roadmap to build on HIPE's success going forward. None of this could be created without the continued work of HIPE teams in hospitals in Ireland, their input into the HIPE review and the input from the myriad of stakeholders.

[a] Healthcare Pricing Office, Ireland

Funding (2)

A framework for considering hospital payment options

Stephen Duckett [a], Andrew Street [b], Chris Walters [c]

There are a number of ways of paying hospitals, activity-based funding being the most prominent currently but block funding, line-item budgeting and fee-for-service are all still used. This paper proposes a framework for considering the circumstances in which one method might be preferred over another. Central to the choice are the objectives of the payer and the hospital - they may have different objectives or attach different weights to them. We discuss the key factors influencing funding model design choice, namely the number of payers and hospitals in the system, what weight payers attach to each objective, and the effort involved in designing and managing the payment system. We argue that there is no "best" payment model, the choice being critically dependent on system characteristics and capacity, and principally related to which objectives the payer wishes to prioritise.

[a] Casemix Consulting Pty Ltd, Australia
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[c] National Health Service, United Kingdom

How have COVID-19 and the Policy Objective of Access to Care Altered the Cost-Volume-Profit Relationships of U.S. Hospitals?

Dana Forgione [a], Arpita Shroff [b], Benedikt Quosigk [c], Rabih Zeidan [a]

Introduction
The theoretical cost-volume-profit (CVP) relationship for any organization assumes market-driven demand and supply functions. When the public policy objectives of cost, quality and access to care influence hospital payment system designs, and the demand for services and case mix is highly skewed by events such as the COVID-19 pandemic with its associated governmental policy responses, the CVP relationships are significantly altered.

Methods
We present theoretical and empirical analyses of hospital CVP relationships using the most recent 10-years of primary source data for approximately 3,500 short-term, acute care hospitals throughout the U.S.--including several forms of governmental, private non-profit, and for-profit hospitals. We compare hospital CVP attributes based on type of control, chain affiliation, teaching status, geographic location, critical access status, patient case mix, payer mix, relative inpatient/outpatient mix, size, profitability, and degree of financial leverage. We develop a hospital volume metric based on patient discharges adjusted by Case Mix Index and the relative proportion of inpatient / outpatient services provided.

Results
We find that hospitals cluster into two broad categories-those with, (a) total cost and total revenue lines that are essentially linear and parallel with a positive contribution margin and no proximate break-even point within the case mix adjusted volume range, and (b) total cost and total revenue lines that fluctuate and cross multiple times within the case mix adjusted volume range. We also find certain hospitals have negative contribution margins, and negative slopes for their total revenue and total cost lines due to the COVID-19 effect of crowding-out elective and non-emergency services.

Conclusions
Our findings demonstrate the counter-intuitive behaviour of hospital economic relationships under COVID-19 and public policy interventions that significantly alter the CVP structure of U.S. hospitals. Our findings provide information useful for the development and tests of economic theory, for evidence-based public health policy making with regard to services and payment systems, and for the advancement of hospital management practice.

[a] Texas A&M University Corpus Christi, United States
[b] University of Houston--Downtown, United States
[c] Kennesaw State University, United States

New tariff structure for the remuneration of inpatient rehabilitation in Switzerland

Rémi Guidon [a], Johannes Kofler [a], Simon Hölzer [a]

Introduction
The Swiss Health Insurance Act stipulates that inpatient services must be billed via flat rates. The tariff partners (Health insurances and service providers) and the cantons have commissioned SwissDRG AG to develop a tariff structure for inpatient rehabilitation. After several years of work, SwissDRG AG has developed ST Reha, a completely new tariff structure for inpatient rehabilitation that is recognised by all partner organisations of SwissDRG AG. The new tariff structure was approved by the Swiss Federal Council in December 2021 and introduced at national level on 1 January 2022.

Methods
The introductory version ST Reha 1.0 is based on cost and medical service data from Swiss service providers from 2019, although significant work has already been carried out with data from earlier years. It is clear from the legal basis and the specifications of the partner organisations of SwissDRG AG that ST Reha must have a strong relation to the medical services. The diagnosis codes according to the ICD-10 GM and the Swiss surgical classification CHOP - which is a specific adaptation of ICD-9 CM - were therefore used to develop ST Reha. The cost data are determined at case level in accordance with the specifications (REKOLE) of the hospital association (H+). The development could be based on 78% of the available data set, which corresponds to a share of 71% of the total dataset. The system development was carried out with the specially designed development environment RiDE (Rehabilitation integrated development environment), which is now used for the development of all tariff structures of SwissDRG AG.

Results
The resulting tariff structure allows for each case to be first assigned to one of the nine basic-RCG (Rehabilitation Cost Group), which is based on the types of rehabilitation established in Switzerland. This allocation takes place primarily via basic service codes, whereby alternative criteria had to be taken into account. Subsequently, the cases are classified into 20 RCGs, which are divided into cost-homogeneous groups on the basis of further characteristics. Within an RCG, remuneration is based on the length of stay at case level, where a RCG is divided into one to three phases, each with a linear remuneration. Remuneration is expressed in the form of a relative cost weight. It should be noted that for the introductory version only one RCG has more than one phase. The quality of the system is measured by the R^2 from a simple regression with total costs as dependent variable and the effective cost weight as the explanatory variable. For ST Reha 1.0 the R^2 is at 0.84.

Conclusions
With ST Reha, it was possible to introduce a simple remuneration mechanism for Switzerland's inpatient rehabilitation sector that adequately reflects the homogeneous services and infrastructure. ST Reha allows each case in the area of application to be grouped first into a basic RCG using basic service codes, then into a final RCG using other characteristics like diagnosis, specific treatment and age.

[a] SwissDRG AG, Switzerland

Funding model design and casemix classification development in aged care

Conrad Kobel [a]

Introduction
Casemix classification and casemix funding are well established in acute hospital care. Funding models reflect the episodic nature of acute care and it is widely accepted that the main cost drivers are the patients' diagnoses and their treatment. However, different types of care and settings such as aged care require different solutions and present new challenges.

Classification development needs to recognise that alternative cost drivers exist in these environments such as physical function, falls risk or other assessed needs. In designing funding models one needs to strike a balance between providing funding certainty and providing autonomy and incentives to providers to be able to deliver care efficiently.

Methods
This presentation draws on several projects recently undertaken in the aged care sector, including a study for the Australian Government Department of Health to develop the Australian National Aged Care Classification (AN-ACC) funding model. We will provide an overview over the general approach adopted and outline in principle solutions as well as discuss selected technical aspects illustrating how casemix-based tools can be used for planning, benchmarking and to improve quality of care.

Results
The developed funding models for residential aged care services and other aged care providers recognise that some costs can be managed by providers while others are outside their control. Therefore, the funding models combine a capacity component based on provider-level characteristics and an individualised component. The former is designed to provide funding for the fixed costs over which providers have little control and provide funding certainty for the capacity to deliver care. The latter allocates funding based on the care or activities provided to individuals and should be based on their assessed needs.

Casemix classification development, not just in aged care, is an iterative process comprising expert advice and statistical data analysis to underpin the funding model. Experts can provide feedback to initial analysis results and valuable insights into potential cost drivers. This is especially true when developing new classifications and routine data is not (yet) available. The additional benefit of involving stakeholders in the development process is the increased likelihood of acceptance by the sector.

Conclusions
With the implementation of casemix funding and classification the typical casemix-based tools become available to providers, funders and policy makers.

[a] Australian Health Services Research Institute, Australia

Classification Development (2)

Introducing Diagnosis-Related Groups in countries with smaller populations - Path towards implementation and typical challenges

Natascha Andres [a], Philipp Wacker [a]

Introduction
Reforming health systems is a top priority for countries worldwide, which is emphasized by the UN sustainability goal of ensuring access to quality health care for people in all countries. However, experience tells us that triggers and challenges are drivers. For example, while some countries struggle with serving a fast-growing population, other countries' challenge is preserving current service levels considering ageing societies and workforce shortages. Patient classification systems (PCS) provide important information to make thoughtful decisions addressing those challenges. Thus, PCSs and their corresponding use in health economics or reimbursement systems are almost always main components of reform initiatives.

Health system reforms - especially in countries with smaller populations - face distinct challenges in contrast to larger populated countries. Those challenges are associated with a lack of resources, knowhow, and limited opportunities to leverage economies of scale through reforms. Thus, a typical question in countries with smaller populations is whether existing classification systems can be leveraged or whether independent systems are required to achieve the reform goals.

We will present a consolidated summary of the experiences made while working with governments in different countries to design and implement PCS systems as a foundation for DRG reimbursement system reforms.

Methods
Our report outlines lessons learned, challenges faced, and success factors derived from our field work in the above-mentioned context. We focus on practical experience with relevance for the audience. This includes highlighting open research questions related to the implementation of PCSs for clinical representatives and other scholars as well as practical guidance to decision-makers implementing respective reforms.

Results
Our experience revealed critical success factors for the implementation of PCS for DRG reimbursement systems. Those include elaborating:

- robust guiding principles based on reform goals,
- a clear view on the current baseline of classification and payment archetypes,

- a clear process for evaluating available classification systems and making necessary adaptions
- a clear view on required resources and sensible timeframes for the reform, and
- a plan for the stakeholder preparation.

However, crucial to successfully execute PCS and reimbursement reforms is the establishment of a strong governance system, which institutionalizes the reform programme. This requires the right decision-makers at appropriate levels within the programme.

Conclusions
PCS and reimbursement reforms are key enablers in health system transformation. However, countries with smaller populations face limitations in available resources and knowhow to self-develop or customize a classification system. Reforms in patient classification and reimbursement systems are not a magic bullet in answering to the above-mentioned challenges and one size does not fit all. The success of the reform is dependent on the design and implementation approach as well the capacity of the entire health system and its responsible authorities. Especially the application of existing classification systems can lead to overoptimistic implementation plans, which prevent necessary adjustments of the PCS to the country context. Awareness of key success factors helps avoiding expensive and time-consuming obstacles during the reform implementation.

[a] KPMG, Germany

Case-mix classification for Dutch homecare payment: Developing a case-mix model

Maud de Korte [a], Anne van den Bulck [b], Gertjan Verhoeven [a], Lieuwe van der Weij [c], Arianne Elissen [b], Silke Metzelthin [b], Teanne de Witte [c], Dirk Ruwaard [b], Misja Mikkers [a]

Introduction
Case-mix based prospective homecare payment is being implemented in several countries to achieve high-quality, efficient, client-centered care. In previous studies, a case-mix model was developed for the Dutch homecare sector based on data from the Case-Mix Short Form (CM-SF) questionnaire. This model explained 21% of the variance in homecare utilization and mostly included characteristics on daily functioning. Therefore, new characteristics were added to the CM-SF that provide a more holistic view of the client. The second version of the CM-SF contains fifteen characteristics, i.e. on daily functioning (n=5), physical health status (n=1), mental health status and behaviour (n=4), health literacy (n=1), social environment and network (n=2) and other (n=2). In this study, we aim to identify which characteristics are relevant cost predictors and develop an improved case-mix model for homecare in the Netherlands.

Methods
The study is designed as a cross-sectional cohort study including clients of six homecare providers operating in various regions of the Netherlands. The data collection of the study is conducted between November 2021 and April 2022. The dependent variable in the analyses is the cost of homecare utilization weighted by the relative wage rates of the professionals involved, for an episode of care (i.e. 4 weeks). An 'episode of care' starts when a client receives a needs (re)assessment for homecare by a registered nurse. The CM-SF is completed by a registered nurse directly after each needs (re)assessment of a client. The independent variables originate from the CM-SF questionnaire and client demographics. The analyses consist of both a data-driven and a expertise-driven approach. For the data-driven approach, relevant cost predictors are identified

using random forest algorithm and regression tree models. The case-mix model will consist of the leaves of the regression tree. The regression tree models are pruned using cost complexity pruning, either for optimal prediction accuracy or to a predefined number of case-mix clusters. Internal validation is addressed by using cross validation at various stages of the modelling pathways. For the expertise-driven approach, the registered nurses involved in the study will construct a case-mix model using the CM-SF items based on their professional insights and we will let the data act as a check.

Results
The data collection has resulted in a sample size of approximately 20,000 clients. The analyses will lead to several case-mix models that will vary on multiple dimensions, such as the number and type of cost predictors included, the number of case-mix clusters, relevance to daily practice and prediction accuracy.

Conclusions
The derived case-mix models will be compared on the dimensions mentioned. The trade-off between model complexity, relevance to daily practice and prediction accuracy will be discussed to facilitate policy choices on the implementation a new payment system for homecare in the Netherlands.

[a] Dutch Healthcare Authority and Tilburg University, Netherlands
[b] Maastricht University, Netherlands
[c] Dutch Healthcare Authority, Netherlands

Case-mix classification for Dutch homecare payment: Developing an instrument to collect data on relevant predictors

Anne O.E. van den Bulck [a], Maud H. de Korte [b], Arianne M.J. Elissen [a], Silke F. Metzelthin [a], Gertjan S. Verhoeven [b], Teuntje A.T. de Witte-Breure [c], Lieuwe C. van der Weij [c], Misja C. Mikkers [b], Dirk Ruwaard [a]

Introduction
Case-mix based prospective homecare payment is being implemented in several countries to achieve high-quality, efficient, client-centered care. In the Netherlands, as part of an ongoing reform of the Dutch homecare payment system, a case-mix model was developed using Case-Mix Short Form (CM-SF) questionnaire data. The CM-SF contained eleven items on commonly used predictors from existing case-mix models for homecare, i.e. on illness prognosis (n=1), functional status in terms of ADL (n=6), self-reliance in terms of instrumental ADL (IADL) (n=2), cognitive functioning (n=1), and informal care (n=1). However, this model, explaining 21% of the variance in homecare use, still requires improvement. Therefore, a Delphi-study was conducted to identify predictors that could improve its predictive value, according to district nurses and healthcare purchasing experts. Based on these findings, the CM-SF was further developed into version 2 in collaboration with stakeholders.

Methods
In the first Delphi-round, participants scored the relevance of the eleven client characteristics of the CM-SF for predicting homecare use, using a 9-Point Likert scale. Participants could suggest missing relevant characteristics. In the second round, after an expert panel meeting, participants re-assessed relevance of pre-existing characteristics that were previously assessed uncertain and of a selection of suggested characteristics. Median and inter-quartile ranges were calculated to determine

relevance. Characteristics that were found consensually relevant were operationalized for inclusion in the CM-SF version 2, based on (parts of) existing validated questionnaire, interviews with district nurses and feedback from stakeholders.

Results
In the first Delphi-round, participants suggested 142 client characteristics, of which eleven were selected for further assessment. The eleven characteristics of the CM-SF and eleven suggested characteristics were assessed on their relevance for predicting homecare use by seventeen district nurses and five purchasing experts. In the second Delphi-round, of the 22 characteristics in total, ten client characteristics were assessed as relevant, with 'Cognitive functioning', 'Learning ability', and 'Social network' achieving the highest consensus for relevance. Other relevantly assessed client characteristics were among others 'Multi-morbidity', 'Mental functioning', and 'Resilience'. The other twelve characteristics were assessed uncertain, which largely concern characteristics regarding a client's daily functioning (including 'Toileting' and 'Dressing') and physical health status (including 'Skin problems' and 'Malnutrition'). None of the 22 characteristics was found irrelevant. Most consensually relevant characteristics such as 'Social network' and 'Health literacy' were complex to operationalize and objectively measure. As a result, the final formulation of the 15 items for the CM-SF version 2 were largely based on input from district nurses.

Conclusions
In general, client characteristics suggested by the participants were more likely to be considered relevant compared to initial CM-SF items. According to district nurses and health insurers, homecare use could be predicted better by including other more holistic predictors in case-mix classification, such as on mental functioning and social network. While including all stakeholders improves their support in the process of development and implementation prospective homecare payment, new difficulties were found regarding the objective measurability of relevant predictors.

[a] Maastricht University, Netherlands
[b] Tilburg Univeristy and the Dutch Healthcare Authority (NZa), Netherlands
[c] The Dutch Healthcare Authority (NZa), Netherlands

Building a new French DRG-classification for non-acute care

Nathalie Raimbaud [a], Nicolas Dapzol [a], Sophie Baron [a], Raphael Schwob [a]

Introduction
The first classification into medico-economic groups (GME), which was the first step in setting up the activity-based funding for non-acute hospital stays, was implemented in 2013. A new version, using leveraging the same data with another methodology in order to make a synthetic index of the severity of stays, was developed in 2018. Despite convincing results in terms of medico-economic relevance, it was rejected by the providers federation representatives, due to a lack of readability of the casemix. Development resumed in 2019, with the aim of building a classification that is readable for professionals, economically sustainable, while maintaining a reasonable number of groups.

Methods
The work focused on the national databases of non-acute care patient hospitalizations from 2017 to 2018 (2,000,000 stays) and on the corresponding cost database (100.000 stays). The classification is made up of four hierarchical levels addressing different questions. The first hierarchical level, reflecting the medical pathology covered, remains unchanged from the first GME classification. The second level indicates the type of rehabilitation received by the patient: it depends on the age, the quantity of rehabilitation acts carried out during the stay, and whether or not these acts are

specialized. The third level translates the level of medico-economic heaviness of the stay, according to the patient's age and dependence, and surgical anteriority. The fourth level, unchanged from the first classification, provides information on the severity of the stay, in connection with other pathologies than the main pathology.

Results

The new classification includes 92 medical groups. Each is divided into rehabilitation groups - pediatric, specialized, quantitatively significant, or other, depending on the type of rehabilitation received. Each rehabilitation group is divided into weight groups, A, B or C, depending on the estimated medico-economic weight. Each weight group is further divided into two severity levels, according to any associated pathologies. The resulting total number of groups is 1144 for full hospitalization and 170 for partial hospitalization. The explanatory power of the model is 19% for the length of stay and 30.3% for costs.

Conclusions

This classification has been in use since March 2022. It has been well received by professionals, due to its good readability: the group codes and labels are understandable and meaningful when reading casemix. Its structure, in four independent hierarchical levels, is adaptable to possible later evolutions of data collection. However, estimating tariffs is harder than before, due to the large number of groups. Prospects for development are identified, with regard to the consideration of rehabilitation in part-time hospitalisation and in pediatrics. In addition, an overhaul of the severity levels is in progress.

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

Thursday 29th September 2022 – Morning

Digital Technologies (Nordcase)

Transforming healthcare - a description of how Gävleborg created new care forms through patient driven triage

Simon Nilsson [a]

Introduction
The Gavleborg county is under heavy demographic pressure and forced to take leaps into a semi-automated digitalization and to build new care forms. We are now completing a 4-year project as our first leap, the object with this presentation is to summarize the project. Starting with our vision from 2017, guiding through expected and unexpected challenges we've encountered and finishing off with early data of the outcome. We will also describe how this implementation gives us possibilities to establish new care forms and break the walls that surrounds a traditional health care-organization and its medical boundaries to achieve a seamless patient-orientated health care. Finally we intend to leave our spectators with unanswered questions regarding how this affects our traditional way of registering health care production and availability and a glimpse of our plans to develop this health care concept further.

Methods
We decided to build an algorithm to provide an automated patient driven triage where every combination of symptoms gives the patient 5 attributes which unlocks the right to schedule a visit in our health care. These attributes are:

- Appropriate profession to meet the patient
- Appropriate speciality and subspeciality
- Appropriate care unit
- Appropriate care form (digital/physical/selfcare)
- Urgency

To match these attributes we've had to implement this platform to every profession and speciality in our health care sector, and also map the clinical competence in every employee. This also enables us to offer a seamless digital care flow when a new health issue comes through the triage and multiple professions/competences are needed to solve it. Today we have 200+ different combinations of professions and specialities mapped which all can take part in an online visit as the first line of care, second line or regarding potential chronic need of digital health care.

With functions like patient driven auto-triage, online multiple-consultants and health care contacts through synchronous/asynchronous chat and automated questionnaires we are trying to find appropriate ways of defining a "care visit", adequate contact-registration and availability measurement methods. But it's not quite that easy and will make it hard in this transition period to compare our new health care with others and historical data.

Results
The final step of the implementation will be in May, and early results will be available in September.

Conclusions
To be decided.

[a] Gävleborg County, Sweden

How telemedicine is handled in the Danish grouping logic

Katarina Bjerg-Holm [a], Karen Anne Aaskilde [a]

Introduction

In recent year, an increasing and more widespread use of telemedicine has been introduced into the Danish health care system. Therefore, the Danish Health Data Authority and the regions of Denmark has developed a model, which allows physical contacts and virtual contacts, i.e. telemedicine to be grouped in the same way within the Danish casemix logic. This change will be implemented in 2023.

Methods

The general idea of the change is the virtual contacts should group to casemix groups in the same way as physical contacts. However, virtual contacts should not in all cases be considered the same as physical contacts.

Within the Danish casemix logic there are multiple types of contacts[1] such as procedure without physical attendance and virtual contacts, which often constitute what we consider telemedicine.

For procedures without physical attendance a limited number of casemix groups is created to contain only this type of activity. In addition, there are a few other groups that can also contain this type of activity. Therefore, only selected procedures will be grouped into a tariff-bearing group.

Virtual contacts should group as physical contacts within the casemix logic, but only to certain casemix groups. In order to ensure this, a predetermined list of approximately 80 casemix groups has been agreed upon in which virtual and physical are interchangeable.

The list of groups will be revised annually.

Results

This method poses a fundamental change in the hierarchy of the casemix logic. Hence, the contact types; diagnosis reporting, procedures without physical attendance, and virtual contacts are gathered at the top of the casemix logic.

Conclusions

The implementation of the changes in the casemix logic, as outlined above, will move the casemix system towards a more appropriate grouping of the reported activity in the National Patient Register. At the same time, the list of predetermined casemix groups, in which virtual activity is allowed to group, will help ensure transparency regarding which casemix groups can contain virtual contacts.

[1] Type 1: Diagnosis reporting
Type 2: Procedure without physical attendance
Type 3: Virtual contactsirtual contacts
Type 6: Own courses
Type 8: In-home contact
Type 9: Other

[a] Danish Health Data Authority, Denmark

Primary care reimbursement model: Development of financial models for primary health care in Iceland Two separate models have been developed, based on model from Vestara Götland in Sweden. One is for the capital area and the other is adjusted for rural area in Iceland.

Arnar Þór Sveinsson [a]

No abstract available

[a] Ministry of Health, Iceland

NordDRG Explorer and NordDRG Admin

Ralph Dahlgren [a]

No abstract available

[a] National Board of Health and Welfare, Sweden

Analysis of Casemix Data (1)

Building a sustainable workforce: Using clinical data to inform workforce planning

Eileen Robertson [a], Patrick McElduff [a], Jim Pearse [a], Susan Mitchell [a], Owen Cho [a]

Introduction

Australia's National Medical Workforce Strategy[1] states, 'to achieve maximum benefit..., the medical workforce must be geographically well distributed and have the appropriate mix of medical specialties in each location'. Australia is a large country, with a population clustered on the coast and within its major cities. Providing services in rural and remote parts of Australia is challenging, and access to some medical services is below that of the major cities. These areas have higher proportions of population groups such as indigenous people who generally suffer lower health status and poorer health outcomes. Methods to determine future workforce demand usually use trends in historical service utilisation as a proxy for health need but may not reflect the underlying need for services. Planning services and the workforce based on the past service utilisation risks engraining rather than tackling inequities in access to services.

Methods

In Australia, casemix-weighted activity data is used to derive measures of utilisation linked to population characteristics. The proposed needs-based approach considers:

- the appropriate measure of **health need**
- how health need relates to the **scope of practice** for the specialty
- translating **health need into service use**
- the **current supply and distribution** of the workforce
- the **role of other specialists or workforce groups**.

The approach uses estimates of disease prevalence and other measures of health need alongside population data to estimate the relationship between health need and service use. We illustrate approaches for psychiatry and cardiology, but the method could be applied to other specialties where there are suitable measures of health need and a robust way of translating disease or condition burden into services.

Results
We were able to apply the approach to cardiology and psychiatry. However, there is not always a direct link between available measures of morbidity or health need and the specialties based approach to organising hospital health care services. A requirement in adopting this approach is to establish what the service requirements are in relation to a given level of health need. This can be established with reference to a normatively determined level (for example, based on expert advice) or an indication of an 'average' or sufficient level of care. This can be complex because there are different ways of meeting the same need in relation to both services and the workforce mix. Despite these challenges it is possible to derive useful information that complements standard workforce and service planning methods. The analysis conducted for Australia indicates that a geographical redistribution of the medical workforce would be needed to meet health needs in a more equitable way.

Conclusions
The paper sets out a framework and method to progressively supplement standard utilisation approaches to modelling future demand with a more needs-based approach. The method can be adapted for other specialties and be refined as the understanding between population health need and service requirements improve. This approach could also be deployed to improve forecasting of service activity and hospital capacity planning.

References
1. Australian Government Department of Health (2022) National Medical Workforce Strategy, 2021-2031 Department of Health, Canberra.

[a] Health Policy Analysis, Australia

Case-mix as a tool to build confidence between partners of newly formed hospital network - preliminary steps.

Peter Heirman [a]

Introduction
The Belgian hospitals are obliged according to the law of 28/2/2019 to construct 25 networks of hospitals. The hospital network Elipse will be the second largest of the country. It will be constituted of 8 public and university hospitals - all located in the province of Liege. Individual hospitals and caregivers need to change from a model of competition to one of collaboration and resource sharing.

In the same network of hospitals, we now have physicians renumerated according to different reimbursement models: fee for service in the public hospitals and fixed revenue in the university hospital. The diminishing Length of Stay (LoS) - a consequence of the system of justified beds- means Elipse's hospitals have lost between 15 and 2 % of their beds in the past 5 years. Also, about a third of Belgian hospitals show a deficit. The combination of these factors does not favour the constitution of a hospital network.

To build confidence and collaboration a project has been launched at the Centre Hospitalier Régional (CHR) de la Citadelle, the Service des Informations Médico Économiques (SIME) of the Centre Hospitalier Universitaire (CHU) de Liège and the Spiral interdisciplinary research centre of the University of Liège. We will be using a combination of sociological and casemix tools to increase transparency and confidence between the different stakeholders.

Methods
To measure the case-mix we use APR-DRG v38 (3M™), which is routinely collected by all Belgian hospitals for financing.

However, quality of coding can vary between hospitals and give rise to artefacts in observed differences. To harmonise this, the same ICD-10-CM & ICD10-PCS AHIMA accredited physician pilots since a year the coding teams of two hospitals.

The board of directors and the individual physicians have been receiving detailed information about the casemix in their own hospitals to familiarise them with this tool.

The next step consisted in putting physicians with the same speciality but working in different hospitals together to discuss their case-mix data: documentation issues, LoS, medication and medical diagnostic and treatment options.

Results
A first result of the confidence building approach, the board of directors of the two hospitals with coordinated coding have validated the constitution of an interhospital study groups focused on casemix.

Different treatment options (LoS, medication, examinations, ...) are discussed, and confidence and relations are being build. We will discuss some of the observed differences in this article.

Conclusions
Case-mix info has shown its usefulness as objective base to bring people from previously competing hospitals together.

The next steps will need to bring more specialities and hospitals in the interhospital working groups. Further continuation of the project is needed to achieve a performant hospital network where all stakeholders can collaborate in confidence and trust, for the common good of the patient.

[a] CHR Citadelle, Belgium

How to switch a manual record collection with an automatic calculation from medico- administrative databases for quality indicators? Example of the quality indicator " Care project, Life project " in rehabilitation care

Sophie Baron [a], Marie-Caroline Clement [a], Robin Louvel [a], Pauline Renaud [a], Joëlle Dubois [a]

Introduction
The hospital Financial Incentive for Quality Improvement program (IFAQ) has been launched in France in 2012 by the Ministry of Health.

Currently, quality indicators used for IFAQ were developed by the High Health Authority (HAS) and are based on data collected from patient files selected at random each year. This data collection represents an important workload for hospitals. So, to reduce it, the Ministry of Health asked Technical Agency for Information on Hospital Care (ATIH) to explore the feasibility to switch the current record with the hospital medico-administrative databases (PMSI) for the calculation.

The "Care Project, Life Project" indicator (PSPV) for rehabilitation care centers (SSR) has been selected. The aim was to analyze the possibility to calculate it from PMSI instead of patients' record with similar results.

Methods
HAS indicators are calculated through an assessment form with 8 criteria (physical examination, social or psychological evaluation) regarding the care and the life projects elaborated for the patient during his stay. At the end, a score is calculated per stay, then aggregated at the hospital level.

Through the PMSI SSR in France, rehabilitation acts (CSARR acts) and activity daily life (ADL) score are routinely collected for each stay and could be used to calculate this indicator. Thus, an algorithm has been developed to approach each criteria from PMSI SSR mainly using both, CSARR acts and ADL. It has then been tested to estimate PSPV for all the stays corresponding to the indicator perimeter used for the drawing lots from 2017 to 2019.

The algorithm results were first analyzed per criteria and per hospital; and were then compared to those obtained from HAS in 2018.

Results
6 on 8 criteria could be approached from PMSI SSR. The ADL score criteria was better for all hospitals from PMSI SSR than from patients' records. However, scores for the five other criteria were lower.

The PSPV global score per hospital was lower from the PMSI SSR than from PSPV records.

Conclusions
HAS approved the calculation based only on 6 criteria as missing criteria do not alter the validity of the indicator measurement.

Results shown poor agreement between the two calculation methods. This could be related to a problem with the CSARR coding (misunderstanding of the wording or lack of completeness).

To further this work, the PMSI draw tools have been improved for the 2021 patient record data collection. This will allow to compare results of the two methods on a stay-by-stay basis and to adapt, if necessary, the PMSI algorithm (Results expected in September 2022). Meanwhile, ATIH will launch campaign to raise hospitals' awareness of the need to improve the recording of CSARR acts by the PMSI. This improvement will be necessary for the changeover without losing the quality of the indicator.

Even if the first results of the PSPV from the PMSI are the worst, this method of calculating indicators from medico-administrative databases should be preferred in the future. Indeed, it avoids increasing the workload of hospitals and allows the results to be calculated on all the activity, and not just on a sample, which increases the robustness of the indicator.

[a] ATIH, France

An internationally verified audit methodology to identify opportunities for improvements in casemix data quality and use in the Kingdom of Saudi Arabia (KSA)

Jennifer Nobbs [a], Manal Al Khalifah [b], Amani Alobathani [b], Victoria Hirst [c], Josh Riley [c]

Introduction

High quality casemix data can improve health service planning, funding, clinical practice and patient outcomes. KSA is undertaking reforms across government sectors under its Vision 2030 program. A comprehensive clinical coding audit by the Ministry of Health Program for Health Assurance and Purchasing (PHAP) was undertaken in 2021 in collaboration with Beamtree, an Australian company working with healthcare data to improve quality, safety and efficiency. The objectives were to:

- Establish a baseline of coding services and quality of coded data
- Understand the status of coding services and readiness
- Provide national recommendations and guidance to enhance coding quality and accelerate implementation nationwide.

The Beamtree audit methodology has been employed in Ireland, Singapore and Australia. It investigates clinical coding, quality of coded data and use of data by stakeholders, providing guidance and support for comprehensive improvements to a health system's casemix data quality.

Methods

These were:

1. A data maturity index and comparison to international best practice focused on people, processes, tools and stakeholder engagement.
2. Performance Indicators for Coding Quality (PICQ®) - measures compliance with classification coding standards and non-specific code assignment.
3. Relative Indicators of Safety and Quality (RISQ™) - reviews data quality underpinning Hospital Acquired Complication rates, benchmarking with risk-adjusted peers.
4. Benchmarking clinical complexity captured through coding compared to the complexity of peers. This may identify under/over reporting of diagnoses and/or interventions.
5. Physical coding audit of a stratified sample of clinical records which measures coding accuracy through re-abstraction and recoding of sample episodes, comparison to original coding and analysis of differences. Observations are made on quality of clinical documentation, clinical queries processes and educational needs of coding teams.

Recommendations typically relate to data consistency, timeliness, transparency; governance; operational performance; infrastructure support; workforce planning, education and management; and advocacy for use of casemix data by stakeholders.

This multi-perspective approach is superior to standard casemix auditing practices as it provides a comprehensive perspective on data accuracy as well as recommendations for service improvement and enhanced use of casemix data. Results drive confidence in data quality, enhance decision-making and support applications of the data for business intelligence.

Results
The KSA audit has led to an improved focus on coding quality and competencies in clusters and nationally, including increased coder training and an improvement in data capture.

PHAP is implementing the audit recommendations. An expanded number of hospitals are now coding and there has been an increase in hiring of coders across MOH hospitals. Clusters have a clear improvement plan for their coding workforce and data quality.

National coding audit is prioritised with adoption of a continuous process to improve focus on coding quality, competencies, data quality and reliability.

Conclusions
Undertaking a focused study on the underlying quality of casemix data can build trust in and increase the usefulness of administrative data. This requires leadership at MOH level in collaboration with technical specialists. Actions must include change in workforce, governance, standards and analytics, alongside leadership and advocacy. Use of internationally verified tools is helpful at national level and encourages learning and adoption.

[a] Beamtree, United Kingdom
[b] Program for Health Assurance and Purchase, KSA Ministry of Health, Saudi Arabia
[c] Beamtree, Australia

Responding to COVID-19 and Climate Change

Estimating cost of COVID-19 hospitalizations in Canada using forecasted financial information

Olga Krylova [a], Stephanie Bonnell [a], Jun Gao [a], Pierre Léveillé [a]

Introduction
Since the onset of the COVID-19 pandemic in Canada in March 2020, CIHI has been providing support and guidance on clinical and financial coding practices to encourage jurisdictional data collection on COVID-19. Despite this, there have been challenges in reporting the costs of treating COVID-19 patients in hospital settings. During the pandemic clinical data were updated regularly on a quarterly basis, while financial data continued to be reported annually with a significant delay. Up until recently, only pre-pandemic financial data were available. This presentation will highlight the methodology used to estimate the costs of COVID-19 hospitalizations based on pre-pandemic financial data. We also will compare those estimates with values obtained with the actual, pandemic year 2020-2021, financial data.

Methods
CIHI has been reporting COVID-19 hospitalization costs on a quarterly basis since March 2021. At that time, neither patient cost data nor aggregate level expenditure data were available. Hence, a methodology was used to create cost estimates based on available pre-pandemic financial data.

A cohort of COVID-19 hospitalizations was compiled from CIHI's Discharge Abstract Database that covers all acute care hospitalizations between January 1, 2020 and December 31, 2021. Case selection was based on ICD-10-CA COVID-19 diagnosis codes. By inflating CIHI's Cost of a Standard

Hospital Stay (CSHS) indicator using Statistics Canada's Consumer Price Index (CPI), we obtained forecasted CSHS values for 2020. These inflated CSHS values were then multiplied by each hospitalization's Resource Intensity Weight (RIW) to create cost estimates for each COVID-19 hospitalization. This approach allowed us to develop cost estimates on a timely basis for quarterly reporting. In May 2022, we were able to update COVID-19 cost estimates with actual CSHS 2020 values that used pandemic year financial data.

Results
The national cost of COVID-19 hospitalizations estimated with the pre-COVID-19 data was 9% lower than the value calculated with the pandemic year financial data. Jurisdictional comparisons revealed differences in accuracy across provinces and territories and varied between 1% and 20%. The true impact of COVID-19 on hospital costs is much greater than what can be predicted by using CPI values.

We also compared cost estimates between COVID-19 hospitalizations and other reasons for hospitalizations, which showed that a COVID-19 hospital stay costs about 4 times more than for influenza and almost as much as a kidney transplant hospital stay.

Other highlights from this analysis include:
- Statistics related to case volumes, length of stay and resource intensity of COVID-19 hospitalizations.
- Comparison of ICU and non-ICU hospitalization cost estimates.
- Discussion of what is included in the health portion of CPI.

Conclusions
Understanding the costs associated with COVID-19 hospitalizations has helped health system managers to better plan and make better decisions in light of ongoing pandemic pressures. While most up-to-date financial information might not be available, this forecasting methodology has helped to provide early cost estimates that are more relevant. They also help to develop critical insight into recent hospital spending and resource utilization to ultimately enable informed decision-making.

[a] Canadian Institute for Health Information, Canada

Impact COVID-19 on non-COVID-19 Care at University Hospital Brussels (ICON study) - preliminary results

Karen Pien [a], Koen Putman [b], Marie Luka De Deken [b], Kurt Barbé [b]

Introduction
In March, Europe became the epicenter of COVID-19, exerting pressure to even the most resilient health care systems. Re-allocation of resources (personnel, units, material) was needed to provide an answer to the massive increase in infected patients, as well as to protect the care labor force and to save non-COVID-19 patients. This was in part achieved by postponement of non-urgent hospital appointments and procedures. Additionally, patients were minimizing their symptoms and avoided approaching health care facilities because of anxiety for infection. Prior epidemic outbreaks showed a large indirect impact on health care utilization due to such divergence of regular care.

The WHO recommends to focus not only on the burden of COVID-19 patients but also on the non-COVID-19 population. Our objective is to quantify the impact of the COVID-19 outbreak on hospital care of non-COVID-19 patients with the aim to render a more efficient healthcare planning as well as management during pandemic waves.

The goal of the project is four-folded:

1. To develop a prediction model to plan the need for ICU capacity, non-ICU capacity and rehabilitation beds for both COVID-19 and non-COVID-19 patients;
2. To analyze the size of reduction in non-COVID-19 admissions during COVID-19 outbreak compared to the pre-pandemic situation for all DRG's;
3. To analyze the differences in hospital length of stay, risk of mortality and severity of illness per DRG between pre-COVID-19 and during the pandemic period;
4. To analyze the impact of the pandemic on the total amount of reimbursement per DRG between the pre-COVID-19 period and during the outbreak.

Methods

We performed a retrospective study, comparing admission and claims data for the period 2019, 2020 and 2021. In order to achieve the project goals, a dataset is constructed consisting of variables that are standardly registered in the Minimal Hospital Data (MHD) and claims data.

Results

The first aim to construct a time-series model for prediction of the bed capacity was examined. During the pandemic period such a time series behaves non-stationary due to strategic interventions as well as policy measures. In order to deal with the non-stationary external influences, we studied an Autoregressive-integrated-moving-average model with an exogenous input (ARIMAX).

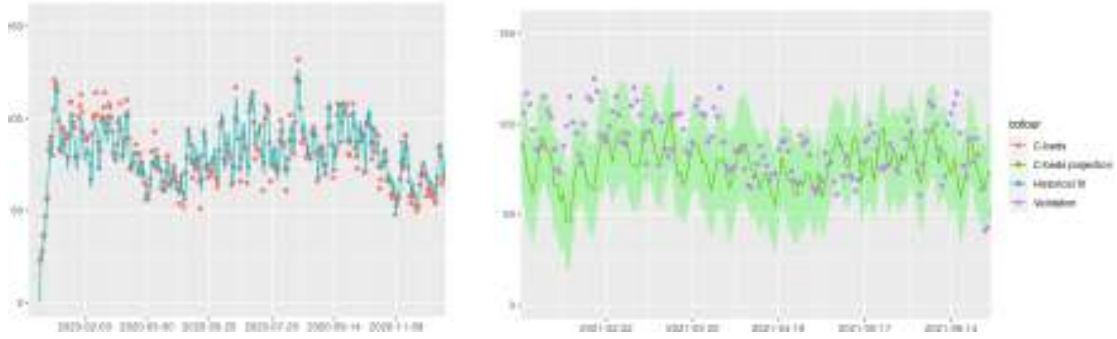

Figure 1: ARIMA time-series model for the first wave Surgical beds (C-beds)

In Figure 1 the ARIMAX modelling approach is illustrated on the surgical beds where the training period (left plot) and validation period (right plot) are shown. During the first pandemic wave, one can see the sudden down-scaling of surgeries which is repeated during the second wave in the fall. The model can describe this non-stationary behaviour while understanding that this was an external influence. Nonetheless, the model is able to extrapolate this behaviour to the next year resulting for the third wave though the model predicts a less abrupt drop which validates nicely to what was measured.

Conclusions

The model approach is promising to study and answer the different research questions stated. Indeed the model is a behavioral model which can fit the past as well as providing a reasonable

prediction for the future while correcting and detecting the non-stationary interventions. Due to the applied model, its parameters allow proper interpretation to enhance future hospital planning.

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Quantifying impact of COVID-19 on hospital costs in a post-pandemic environment

Samuel Webster [a]

The Independent Hospital Pricing Authority (IHPA) is a federal Australian agency established in 2011 to facilitate the implementation a national activity based funding model for Australian public hospitals. IHPA develops classification systems and hospital activity and cost data collection systems, which is then used to calculate and deliver the national efficient price for Australian public hospital services each year.

COVID-19 has provided a significant challenge for health system funding around the world. Australia offers an interesting case study into the cost impacts of COVID-19 due to a small number of community cases relative to the rest of the world, particularly in the early months of the pandemic.

Australia has well-established long-standing comprehensive activity and cost data collections allows us to use historical trends in activity and cost of hospital care to understand the impact of the onset of COVID-19 on hospital service costs at the patient level.

The primary motivation for this work is that lag between data collection and price setting for hospital funding in Australia is approximately three years, meaning that price setting must prospectively account for longer term impacts of COVID-19 on the hospital system.

This work presents IHPA's approach, utilising these comprehensive data, to derive the estimate of 0.2%, an average of AUD$8 per inpatient, in long term cost increases due to COVID-19, which is used for the purposes of hospital price setting and funding in Australia.

Patient level activity and cost data up to June 2019 is used to forecast hospital capacity and historical unit costs to derive an estimate of pre-pandemic unit cost for the period July 2019 to June 2020.

Comparing these pre-pandemic unit costs with actual reported costs from March 2020, we estimate the unit cost of patient care during the months immediately following the onset of the pandemic, quantifying the increase in unit costs above pre-pandemic levels.

Using forecast expected hospital activity levels, the increase costs attributable to COVID-19 can be further disaggregated into the cost of inefficiency in the system (e.g. from unutilised hospital capacity - when hospitals were kept empty in preparation for a large influx of patients) and additional input costs as a result of the pandemic (e.g. additional cleaning and patient screening).

Before the onset COVID-19 pandemic, the unit costs are estimated to increase by 2.6%. IHPA's modelling estimates activity throughput was deflated approximately 16% during the pandemic, resulting in an estimated 16% increase in unit costs due to COVID-19, comprising both system inefficiencies and expecting enduring cost increases due to changes in service delivery models.

This substantial increase in unit costs includes effects of system inefficiency due to reduced capacity, and increased input costs for service provision. Under the assumption that hospitals are operating at full capacity, the majority of the post-pandemic cost increase is attributed to system inefficiency, with 0.2% ($8 per unit) attributable to expected enduring costs in a post-COVID environment.

These results are based on assumptions clearly indicated in the National Efficient Price 2022-23 Determination[1] which cover expected hospital throughput, casemix variation, and use government subsidies. IHPA is currently undertaking analysis of more recent hospital cost and activity to test these assumptions and refine the results.

Many of these assumptions are necessary caveats that arise due to limitations in the data collection, and complex Government funding arrangements for Australian hospitals. For example, additional personal protective equipment (PPE) was funded by other government programs, and had vastly increase costs in the short term due to worldwide demand. Additional input costs such as this were not reported consistently across the country: approximately half the country had indirectly allocated across the whole financial year, so that COVID-driven cost increases cannot be easily identified. While our method was able to reallocate misallocated costs separated and reallocated to the post-pandemic period, the reallocation was based on statistical modelling, and improved costing practices would improve these results.

References

1. https://www.ihpa.gov.au/publications/national-efficient-price-determination-2022-23

[a] Independent Hospital Pricing Authority, Australia

Getting to Net Zero Carbon - Implications for the Classification Community

Mary Ethna Black [a]

Introduction

As our demand for data to support the classification of diseases and interventions increases, we face a paradox when it comes to the imperative to reach Net Zero Carbon and save the planet. Those who use data are often distant from the carbon costs of the data itself, but this is no longer a valid argument. As responsible citizens we must assume responsibility for the carbon costs of our data ecosystem. The Intergovernment Panel on Climate Change IPCC report 2022 warned that the world is set to reach the 1.5ºC level within the next two decades and said that only the most drastic cuts in carbon emissions from now would help prevent an environmental disaster.

Methods

I will draw on my experience in massive health data systems, my work with scientific climate modelling bodies, and my current role as the Chair of the advisory board for UK Research and Innovation NET Zero Digital Research Infrastructure Project. UKRI is the peak research body in the UK and encompasses health and social care research and data. I will use the findings of this project to refine the challenges, define the principles, and current evidence and options for action relevant to the audience of the conference. I will focus on data production and use, as this is most relevant to this conference.

Results

The interim evidence report for the UKRI initiative is being finalised in June and July 2023.

Conclusions
Clear steps can be taken in relation to data efficiency, prioritisation, hardware and energy choices, policy levers. Every conference now should embed climate change into the agenda, call for papers and workstreams. This will allow the specialised groups who attend scientific meetings to contribute to the debate, be accountable, and take action.

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Classification Development (3)

Development of a population-based classification system for assessing morbidity-related health care needs in Germany

Karen Kinder [a], Wilm Dr Quentin [a], Maria Klemt [a], Chrissa Tsatsaronis [a], Benedikt Langenberger [a], Reinhard Busse [a]

Introduction
An essential prerequisite for improving the equity of health care is the knowledge of the distribution of morbidity-related health care needs. In Germany, there are no suitable analytical instruments for this purpose. Internationally, health care needs are often determined with the help of population-based classification systems, such as Adjusted Clinical Groups (ACGs) or Clinical Risk Groups (CRGs). Such classification systems (cell approaches) assign each insured person to exactly one group, which is characterized by certain clinical properties (e.g., diagnoses, multimorbidity, age) and need for specialized care.

Methods
The development of a population-based classification system (PopGroup) is an iterative process. Medical expertise is taken into account as well as results of analyses of the routine data of a large statutory sickness fund. Based on the full model of 1072 Dx groups (DxGs) defined for the Risk Structure Adjustment used for levelling population disease burden within the German sickness funds, medically meaningful summarized disease groups (ZKGs) are defined (circa 400). Then, based on the ZKGs, roughly 600 mutually exclusive Basis PopGroups (BPG) are formed which are then further stratified forming the close to 1200 terminal PopGroups, to which an insured person can be assigned exactly once, based on individual characteristics as well as medical and treatment characteristics. These PopGroups are both medically meaningful and comparable with respect to their current care needs (economically homogeneous). In the last step, larger Meta-PopGroups (<12 groups) with similar resource consumption are formed.

Results
The definition of a first set of ZKGs, is completed and is currently being validated by medical experts. The definition of Basis PopGroups is in progress, whereby different methods of "unsupervised" and/or "supervised learning" are used (e.g. cluster or CART analyses). In the fall 2022, the first application tests of the PopGrouper are planned, for instance, for the planning of healthcare facilities, for regional comparisons of quality and efficiency of care, or for the evaluation of interventions.

Conclusions
While challenges in the development of medically meaningful and economically homogeneous PopGroups exist, the authors are confident that efforts to create a classification system will be

successful. This presentation will explain the context of this project, the results of the work done to date as well as potential future applications for the use of the PopGroup classification system.

[a] Technische Universität Berlin, Germany

Understanding Population Health Segmentation and Stratification through the use of Patient Need Groups (PNGs)

Mandy Kearney [a], Klaus Lemke [b], James Barrett [c], Stephen Sutch [b]

Introduction

Population segmentation is an analytical technique used to understand populations and match clinical need with appropriately resourced interventions and resources. A segmentation-driven approach facilitates improved delivery of health services and allows for more nuanced tracking of outcomes.

Risk stratification differs from segmentation in that it identifies people at high risk of a certain event or high health care costs. In other words, risk stratification ranks individuals within a population based on degree of need, whereas segmentation groups individuals within that population based on what that health need actually is.

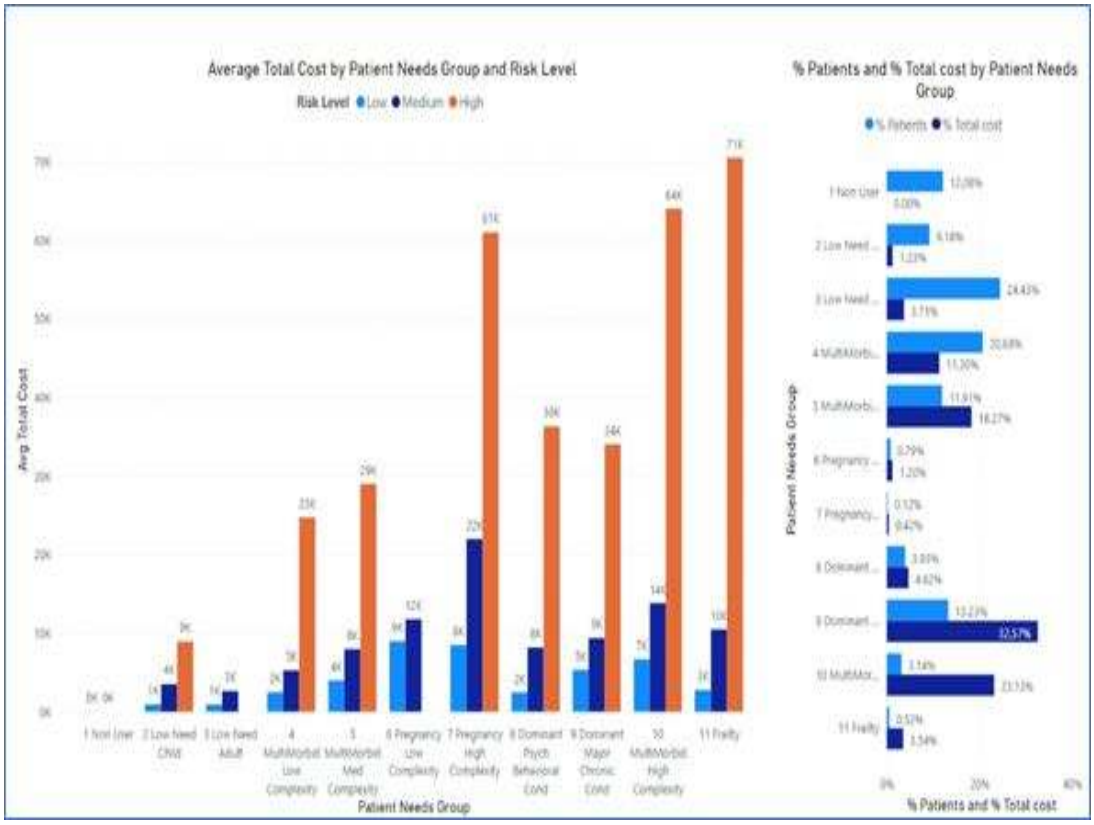
This paper will discuss segmentation and stratification, and show how the new ACG based Patient Need Groups (PNGs) and predictive risk models can be used to first segment and then stratify a population, and how this can help align resources with need.

Methods

The development of PNGs considered 3 constructs: Population Segments (PNGs); Care Modifiers; and Risk Stratification. The PNG methodology builds on the morbidity markers already available in the ACG System. Patients are assigned to one of eleven mutually exclusive population segments based on the individual's range of morbidities, conditions, and care needs. Each segment can optionally be further subdivided by using "Care modifiers", which identify individual traits with opportunities for intervention (for example poor care coordination). Finally, each segment can optionally be subdivided into risk strata e.g. low, medium, and high risk of high total cost in the following year, which enables prioritization of individuals within a particular segment.

Results

Typical population views available using PNGs will be shared. Examples of the use of care modifiers to reveal actionable patient-specific cost-savings opportunities will be discussed.



Discussion

Segmentation using PNGs provide an overview of the healthcare needs of a population which can help inform the design of care models for the population. The approach aggregates existing markers and population characteristics associated with complex and high-risk patient groups, in a

comprehensive population health view. Care modifiers allow patients to be targeted for specific actionable interventions. Risk stratification within segments provides a way of prioritising patients for intervention when resources are limited. The approach is modifiable for national or specific populations needs, so provides the ability to analyse care need and utilisation in vulnerable populations, while ensuring a comprehensive representation of the whole population.

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[b] Johns Hopkins University, United States
[c] Johns Hopkins Healthcare, United Kingdom

Optimising severity determination in the French DRGs with the exclusions mechanism

Raphael Simon [a], Alexandra Delannoy [a], Nicolas Dapzol [a], Vincent Pisetta [a], Raphael Schwob [a]

Introduction
French acute and non-acute care hospitals are primarily financed through activity-based funding and a dedicated classification of inpatient stays within homogeneous diagnosis-related groups (DRG). Case-complexity is further determined by an algorithm assessing, for each DRG, which associated diagnoses (AD) are linked to a significant deviation from the mean length of stay (LoS) of the group. In light of the recent redesign of the algorithm and in order to optimise its performance, our goal was to identify which code-pairs (MD+AD) should always be excluded from the calculations.

Methods
Code-pairs were constructed from the ICD-10-FR, excluding letters V to Y. The foundational set of code-pairs was made by pairing each code with itself, as well as with all codes sharing the same first three characters. Beyond the foundation, a taxonomy for identifying and validating pairs was elaborated by a multidisciplinary group made of statisticians and clinicians. It revolves around redundancy. Redundancy was split into two dimensions : litteral and medical. Litteral redundancy designates pairs with identical definition but residing in different categories, e.g. for use in pediatric and adult populations, and codes included in other codes. Medical redundancy designates pairs expected to yield no additional expenses in resources, meaning either a common benign symptom or manifestation and their cause or conditions requiring the same treatment. An algorithm parsing instructions and code-pairs allowed us to generate a lot of pairings with few instructions, and a web-application built with RShiny allowed for quality control. Impact analysis and quality control were conducted by using the complete 2019 database of national hospital stays across both settings.

Results
The final list holds 4.9 million code-pairs, generated through 1100 hand-made instructions. In the benchmark data, 2.36 million stays (12.5% of total stays for the year) were impacted by exclusion pairs in acute care and 0.37 million (25% of total stays) in non-acute care. The performance gains from using this list were be assessed by analysing which ADs have their estimated complexity score changed prior and after the use of the list. The R^2 for LoS distribution in the acute-care setting moved from 41% to 42% before/after introducing the reworked set of exclusions. In non-acute-care, the R^2 moved from 20% to 22%. An upcoming quality control will help us target instructions for further refinement to better handle fringe cases.

Conclusions
A reproducible pipeline for building a set of code-pairs exclusions into the French algorithm for estimating case-complexity within the DRGs has successfully been elaborated and tested. Further revisions and quality control are planned to follow along the larger body of work on revising the agency's approach to evaluating complexity across hospital settings.

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

How to improve severity determination in the French DRGs ?

Nicolas Dapzol [a], Vincent Pisetta [a], Raphael Schwob [a], Alexandra Delannoy [a], Raphael Simon [a]

Introduction
The French DRG-classification for acute-care hospitals is two-pronged: first the algorithm identifies the major cause of the stay and then a severity level based on additional diagnoses (AD) is attributed in order to account for the marginal economic burden from the patient's other morbidities and/or acute complications during the stay. Currently, a stay's severity level is equal to the maximum level within its additional diagnoses. This model has been used for the past 10 years. Iterative revisions have led to marginal changes across time. Providers have mentioned the limits of the current model, particularly in its ability to adequately describe complex, multiple pathologies stays. Our goal was to develop a new model for the determination of the severity level.

Methods
Patient stays in 2017 and 2018 from the national database of patient hospitalizations in acute care were used in the analysis (around 16.000.000 stay), combined with stays from the corresponding patient hospitalization costs database (around 1.100.000 stays). A bespoke statistical methodology inspired by gradient descent was elaborated to optimize the R^2 of the distribution of length of stay (LOS) and costs severity classes. The optimization targeted three areas of improvement:

- the number of severity levels for a patient's stay
- combining the effects of multiple additional diagnosis into higher severity
- conditioning the severity level of additional diagnoses to the main diagnosis

Physicians reviewed and suggested changes to the statistical model to ensure medical coherence. Lastly, providers representatives were presented with the results to keep them informed and allow them to make an informed decision.

Results
Increasing the number of severity level from 4 to 5 increased the R^2 by 1 point (from 41.7 to 42.7%), while multiplying the number of groups.

Combining the effects of multiple additional diagnosis increased the R^2 by nearly 5 points (from 41.7 to 46.3 %). This increased to 6.6% with 5 levels of severity (48.3%).

From a model complexity perspective, performance is increased with a low number of combination rules. Meanwhile, from a medical standpoint, physicians deemed the results coherent, leading to readable and understandable examples of classification.

Finally, conditioning the severity level of additional diagnoses to the main diagnosis seems to trade a low economic performance gain with a high model complexity increase.

Conclusions

New orientations for the determination of stay's severity were investigated. First and foremost, combining the effects of all additional diagnosis beyond the main yields a very significant performance gain: the economic burden of a stay depends on the number and weight of additional conditions considered. The current iteration of the model has good economic performance and medical coherence. Our work will continue by engaging further discussions with stakeholders to refine the next iteration model.

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

Thursday 29th September 2022 – Afternoon

Classification and Data Analytics (Nordcase)

Three different outlier calculation methods, their impact on DRG homogeneity and hospital funding

Kristine Putnina [a]

The aim of outlier calculation method analysis is to evaluate three methods for determining outliers to choose the one that combines simplicity and accuracy in calculations, improves the homogeneity of [DRG] groups, has a low number of outliers, offers the economic balance at the level of expenditure of the National Health Service and income of the hospital, ensures the principle of fairness in health care funding.

Three methods for determining outliers in the DRG data array were used in this work:

1. Interquartile range (1.5 IQR),
2. Parametric confidence interval for a population mean, with the known standard deviation (STD),
3. Parametric confidence interval for a population mean, with a population variance (V%).

All calculations were made using MS Excel.

The cost data used for calculations are based on manipulation and bed day tariffs, not actual patient level costs. The reason - there are 3 pioneer hospitals just starting to calculate the patients level costs in Latvia.

The obtained results are different in terms of the number of outliers. In terms of percentage, the results of the first two methods were the closest - the IQR method recognized 6% of outliers from the whole data set, the parametric standard deviation method 7%. The parametric coefficient of variation method resulted in 22% of identified outlier cases in the entire DRG data set.

Evaluating the changes of the coefficient of variation (V%) after data trimming, it is concluded that in general a positive effect is observed, where between the first two methods used insignificant but better results are shown by the 2nd - Parametric Standard Deviation Method. The third method of detecting outliers after their trimming, has had the greatest effect on the positive change of V% - reducing number of cases (episodes of care), where V% amount is 50% and more, by more than 300 cases and increasing number of cases with V% from 0-50% three times.

All three methods have an impact on the level of funding for hospitals. The difference in funding mostly depends on the level of complexity of patient health conditions they treat, and resources are used for it. The last of the methods - Parametric Coefficient of Variation method is recognized as the most additional financial resource-intensive. The other two methods show similar results with a less impact on necessary funding amount.

The most appropriate method of identifying outliers is considered the first - interquartile range method, mainly due to the amount of additional funding required and the impact on homogeneity.

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International Classification of Health Interventions in relation to Swedish Classifications of Health Care Interventions (KVÅ).

Ann-Helen Almborg [a]

Introduction

Currently there is no international classification to describe interventions across all sectors of the health system. The World Health Organization's third reference classification, the International Classification of Health Interventions (ICHI), is planned for completion by late 2022. A health intervention is defined in ICHI is 'an act performed for, with or on behalf of a person or a population whose purpose is to assess, improve, maintain, promote or modify health, functioning or health conditions'.

The presentation will introduce ICHI content and explain the underlying tri-axial structure and the underpinning biopsychosocial model. ICHI consists of over 7,000 interventions (stem codes) across 28 chapters. Additional information about an intervention can be added, if needed, using extension codes.

ICHI can be used to describe diagnostic, therapeutic, preventing and managing interventions in the care process and complements the International Classification of Functioning, Disability and Health (ICF) and the International Classification of Diseases (ICD). Information on diagnoses, functioning and interventions may be used to describe and evaluate care including rehabilitation at both individual and group level. ICD, ICF and ICHI can be used in electronic health records to record health and health care for individuals, with aggregate data then used to monitor health system effectiveness and improve quality of care. The three classifications offer common language and common conceptual structures to support the communication between health professionals and between different parts of health services systems.

ICHI provides an important tool for use in policy, research and practice to describe, collect, aggregate, analyze and compare data on health interventions across all sectors of the health system at local, national and international levels in a standard way.

In Sweden the Classification of Health Care Interventions (KVÅ) are used. The KVÅ consist of two parts, one for surgical interventions and one for medical interventions (including functioning interventions).

The aim of this pilot study was to perform mapping between a part of interventions in the KVÅ and ICHI to describe the relation between these two classifications of health interventions.

Methods

The mapping of 50 surgical orthopaedic interventions and 50 functioning interventions (both diagnostic and therapeutic) was performed by using the mapping guidelines developed by WHO-Family of Classifications Network. The result of the mappings was described as cardinality and degree of equivalence. The different syntax described in the guidelines for using ICHI stem code(s) and extension code(s) was used in the mapping.

Results

The result show that there are differences in the mapping results for surgical and functioning interventions. The surgical interventions in KVÅ could mostly be mapped to one or two ICHI stem code by using one or more extension codes to receive equivalence for the mappings. The functioning interventions in KVÅ are broader than the ICHI interventions and only a few extension codes were used. The presentation will show some different maps from surgical interventions and functioning

interventions in KVÅ to ICHI.

Conclusions
ICHI can be used to describe the interventions in KVÅ. Our experiences are that mapping to each axis and to map sections by sections in the source classification (KVÅ) improve the quality. Using cardinality and the degree of equivalence are important information to show the mapping results.

[a] National Board of Health and Welfare, Sweden

Assessment of disease burden based on realtime national registers on hospital discharges and contacts with primary health care

Sigridur Haraldsdottir [a]

No abstract available

[a] Directorate of Health, Iceland

Education of health care professions: The National University Hospital of Iceland: Strategy planning and implementation of DRG and integration with the study program of Health Information Management at the University of Iceland, School of Health Sciences.

Klara K. Fridriksdottir, Gunnvor S. Karlsdottir [a]

No abstract available

[a] Landspitali and University of Iceland, Iceland

Analysis of Casemix Data (2)

Identifying Peer Long-term Care homes using RUG-III: a data driven tool

Rachel Zhang [a], Luke Turcotte [a]

Introduction
The Resource Utilization Groups (RUG-III) case-mix system is used to classify residents in long-term care (LTC) homes. In Canada, over 1,400 LTC homes submit interRAI assessment data to the Canadian Institute for Health Institution. These data are used to compute risk-adjusted indicators of quality which are reported publicly (YourHealthSystem.CIHI.ca). Increasingly, care providers are interested in understanding how their facility performs relative to others providing similar services to persons with similar needs. Peer comparators are often identified based on facility structural attributes and administrative information. These attributes are usually pre-defined without frequent updates.

To better support LTC homes in quality improvement planning, CIHI has developed a dynamic data-driven proof of concept to match peer facilities based on case-mix attributes.

Methods
Six years of interRAI assessment data from all LTC homes Complex Continuing Care hospitals across Canada (2014-2019) were used to build the peer selector methodology.

A K-Nearest Neighbour (KNN) machine-learning classification algorithm based on Gower's distance is used to quantify the similarity between each pair of facilities. This algorithm uses information on:

- Overall RUG-III distribution over seven categories
- Case Mix Index (CMI)
- Facility size
- Sector
- Province
- Urban/Rural area

An interactive R Shiny App allows choice of different case-mix metrics combinations to identify the most similar peers across Canada. Based on user needs, different weights can be assigned to the above factors. Closest peer facilities (e.g., "Top 5 peers") are determined for any facility of interest. Thereafter, risk-adjusted measures of quality of care can be compared among the selected peers.

Results
The Gower's distance measure provides the flexibility of evaluating facilities' closeness based on both numeric and categorical metrics of users' choice. Preliminary evaluations demonstrate that the majority of facilities can be matched to at least five similar peers. Difficult to match facilities include speciality LTC homes (e.g., psychogeriatric care) with unique case-mix distributions.

Conclusions
CIHI's peer selection methodology is a data-driven approach to identify peer facilities based on case-mix. Using this tool, peer selection becomes an automatic process rather than static mapping. It provides the flexibility to leverage new interactive tools (e.g., R Shiny) to refine peer matches based on user needs, thereby enabling quality performance goal setting based on realistic and achievable benchmarks.

[a] Canadian Institute for Health Information, Canada

Predictive Models of the Risk of Hospital Admission and Future Healthcare expenditures: The benefits of recalibration

Stephen Sutch [a], Klaus Lemke [b], James Barrett [c]

Introduction
A number of models are available in the US and worldwide which predict the risk of hospitalisation and healthcare expenditures, from general and insured populations. These are being used for a variety of purposes including, screening of patients for Case Management Programs, screening for Disease Management Programs, organisational profiling, and assessing financial risk. These uses are in response to health policies to reduce unnecessary hospital admissions, such as of Pay for Performance (P4P) measures, to a genuine need to support populations in avoiding hospital admissions that are both expensive and a patient safety risk.

Methods
The predictive models were derived using patient level data, with classification of diagnostic, pharmaceutical and historic utilisation data, using the Johns Hopkins ACG System to reduce the number of variables and provide measures of multimorbidity. Logistic and Linear Regressions were undertaken to produce models on the outcomes of hospitalisation within 12/6 months, emergency/unplanned hospitalisation within 12 months, and health care expenditures in the preceding 12 months.

The models were validated using split-half method and providing AUC analyses to compare different model performance.

Results
Results will be shown from US populations and multiple general populations in Europe. Although the original models generalise well to other populations, the recalibrated models using local data produce better performance.

Discussion
Comprehensive person-based records are important input to such models, particularly with health policy being orientated to integrated care. Local recalibration of models ensures that models are relevant to the population they will be applied to, provide better overall performance than the original models, and give an opportunity to measure the benefit of new or additional local data variables. Using traditional modelling techniques, such as logistic and linear regression, these models can be created efficiently and provide good face validity for local users of the models.

It is important to make use of casemix classifications to reduce data complexity and provide robust measures of key constructs such as multimorbidity. Whilst the emphasis of work has been on identifying the highest risk individuals, there is an increased interest in recognising earlier and emerging risk, where more preventative methods can be informed such as chronic disease self-management programs. These models in their current form are being used to identify populations, but work on newly emerging data from Electronic Health Records (EHR), Personal Health Records (PHR), and Social Care data is expected to provide greater insight into these populations and those with highest need.

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The disease burden of ENT in-patient cases in 2020 according to My-DRG code at a teaching hospital

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Introduction
Ear, Nose and Throat (ENT) cases are one of the top global diseases in 2015 with hearing loss was the 4th most common chronic disease. Furthermore, otitis media was the third most common short-term disease and increment up to 100% for head neck neoplasm cases from 2005 - 2015. This study aims to establish the most common ENT in-patient cases according to My-DRG classification at one of the teaching hospitals in Malaysia as to understand the disease burden of ENT cases and the

relevance of such admission for future management.

Methods
Retrospective data from electronic medical record for ENT admission in 2020 were obtained. Information related to admission such as primary data and secondary diagnosis and free text procedures were extracted. The data was coded by trained coders which combine both ICD-10 for the diagnosis and ICD9-CM for the procedures and imported into a case-mix grouper to generate the DRG codes. The final data was sorted according to the severity based on Malaysia Diagnosis-Related Group (My-DRG) and ICD-10.

Results
A total of 680 in-patient ENT cases were treated at the hospital in 2020. The top five DRGs for ENT cases were Other Factors Influencing Health Status - mild (Z-4-12-I) (n = 145 (21.2%)), Other Factors Influencing Health Status - Moderate (Z-4-12-II) (n = 48 (7%)), and Other Ear Nose Mouth & Throat Operations - Minor (U-1-20-I) (n = 42 (6.1%)), Operation of Thyroid Parathyroid & Thyroglossal Duct - Minor (E-1-20-I) (n = 27 (4%)), and Tonsil & Adenoid Operations - Minor (U-1-15-I) (n = 24 (3.5%)). Among the total cases, there were 497 mild cases, 137 moderate cases, and 46 severe cases. For the mild cases, the most common DRG was Other Factors Influencing Health Status - Mild (Z-4-12-I) (n = 145 (29%)). The mean Average Length of Stay (ALOS) was 5.52 days. The range of LOS = 1 - 50 days. The mean age = 48.36 years old (Range: 0 - 88). The male patients were 283 (56.9%) and the female patients were 214 (43.1%). For the moderate cases, the most common DRG was Other Factors Influencing Health Status - Moderate (Z-4-12-II) (n = 48 (35%)). The mean ALOS was 8.7 days. The range of LOS = 1 - 143 days, mean age = 54 years old (Range = 0 - 88). The male patients were 81 (59%) and the female patients were 56 (41%). For the severe cases, the most common DRG was Other Factors Influencing Health Status - Severe (n = 19 (41.3%)). The mean ALOS was 13.8 days. The range of LOS = 2 - 109 days, mean age = 56.9 years old (Range = 24 - 81). The male patients were 26 (56.5%) and the female patients were 20 (43.5%).

Conclusions
In conclusion, ENT admissions did not reflect the status of a teaching hospital. As a tertiary hospital, the hospital is expected to function in managing more complex and complicated cases. Hence, this study can be used to inform the hospital management to manage efficiently.

[a] University of Malaya, Malaysia
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[c] University Malaya Medical Centre, Malaysia

Shaping a value-based healthcare system for Luxembourg based on data

Francois Muller [a]

Introduction
The Grand-Duchy of Luxembourg is in the process of defining its national health strategy based on discussions that took place on the health round table and based on health data. The presentation aims to show the process of data collection towards strategy development.

Methods
After having introduced clinical coding in 2017, Luxembourg has proceeded to launch a health round table in 2020, gathering all health leaders of the country to discuss how a sustainable health system

can be shaped. The discussion of this health round table (in Luxembourgish: Gesondheetsdësch www.gesondheetsdesch.lu) were supported by health data and will ultimately lead to the national health strategy that will be published before the PCSI conference. The presentation will thus give an overview of where Luxembourg stands in terms of clinical coding and data production and analysis in general, of what the future challenges that were discussed by the health round table consist of and how both of these elements lead to a national health strategy that in return will lead to a value-based approach and more integrated patient pathways.

Thus, the methods used in the process are the following:

- Data production based on ICD-10-CM, ICD-10-PCS and APR-DRG
- Data analysis and more importantly data projections
- Literature and best practice research
- Health round table
- Strategy development process

Results
The results consist of the availability of the relevant data, the consolidated results of discussions around the health round table as well as a comprehensive health strategy for the years 2022 to 2030.

Conclusions
The case of Luxembourg shows how health data can be used to gather all stakeholders of a healthcare system around a table to discuss evidence-based challenges and ultimately defining a national health strategy.

[a] Muller Healthcare Consulting, Luxembourg

Data Quality (1)

The Evolution of Classifying and Grouping COVID-19 In the US and its Impact on Quality Health Data

Kathy Giannangelo [a]

Introduction
Accurate COVID-19 data reporting is needed to support clinical care, organizational management, public health reporting, population health management, and scientific research. However, this has proven difficult in the United States (US) as the International Classification, 10th Revision, Clinical Modification (ICD-10-CM) codes, their associated coding guidance, and DRG grouping has evolved several times since February 2020.

Methods
An evaluation was undertaken of the COVID-19 ICD-10-CM codes and their coding guidelines starting with the interim COVID-19 coding advice published in February 2020 to April 1, 2022. In addition, the Medicare-Severity - Diagnosis Related Group (MS-DRG) changes made because of the code and guideline revisions were also reviewed. All updates to the ICD-10-CM codes and the ICD-10-CM Official Guidelines for Coding and Reporting announced by the Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS) and the MS-DRG revisions published

by the Centers for Medicare and Medicaid Services (CMS) were assessed. Changes were noted with their effective date. An analysis of the impact on data quality because of the evolving ICD-10-CM codes, guidelines and DRG changes was completed.

Results
Preliminary results show variability in the administrative data spanning the full course of the timeframe. For example, while other parts of the world had Chapter II, Codes for special purpose, available via the World Health Organization (WHO) ICD and various country ICD modifications, the US had no such chapter in ICD-10-CM. Thus, when the WHO activated emergency code U07.1 for 2019-nCoV acute respiratory disease in February 2020, this code was not an option for use in reporting COVID-19 in the US. The NCHS guidance at the time was to use B97.29, Other coronavirus as the cause of diseases classified elsewhere. Subsequently, on April 1, 2020, chapter 22, Codes for special purpose (U00-U85), section Provisional assignment of new diseases of uncertain etiology or emergency use (U00-U49), category U07 Emergency use, and U07.1, COVID-19, was added by NCHS to ICD-10-CM. Coding guidance for COVID-19 infections included using U07.1 for only confirmed cases, which was defined as those documented by the provider, documentation of a positive COVID-19 test result, or a presumptive positive COVID-19 test result. Further guidance stated if an individual had tested positive for the virus at a local or state level, but it had not yet been confirmed by the CDC, the presumptive positive COVID-19 test result had been meant. These guidelines were in effect from April 1, 2020 to September 3, 2020. Furthermore, WHO ICD-10 U07.2, COVID-19, virus not identified used when COVID-19 is diagnosed clinically or epidemiologically but laboratory testing is inconclusive or not available has never been adopted by the US for inclusion in ICD-10-CM.

Additional results will be explained along with the analysis of the impact on data quality because of the evolving ICD-10-CM codes, guidelines and DRG changes.

Conclusions
Knowing the COVID-19 coding and data reporting changes from February 2020 to April 2022 are key to understanding the quality of the health data reported for clinical care, public health reporting, population health management, and scientific research.

[a] KGC, United States

COVID-19 Ensuring accuracy of coded data

Helen Nolan [a]

Introduction
The Hospital Inpatient Enquiry System (HIPE) is managed by the Healthcare Pricing Office (HPO) within the Health Service Executive (HSE). It is responsible for the collection and reporting of hospital inpatient activity data for all public acute hospital inpatient and day case discharges and support and training for the 300 HIPE clinical coding staff. The HPO's coding team manage HIPE data quality and audit activities for approximately 1.7 million discharges per year.

The first case of COVID-19 was reported in Ireland on 28th February 2020. Fast access to accurate COVID-19 data was required to track, monitor and support the health system. Patients with COVID-19 had to be coded within 48 hours of discharge. Due to the pandemic chart based audits carried out by the HPO ceased with desk top reviews performed instead. HIPE data on COVID-19 was widely used across the health service involving more scrutiny of data.

The work carried out by the HPO to ensure that all COVID-19 cases were accurately coded as needed for analysis by Department of health and other agencies is described below.

Methods
New ICD-10-AM codes were released by the Independent Hospital Pricing Authority (IHPA) to enable the collection of COVID-19 data. Several updates of codes and guidelines were issued throughout 2020 and 2021. Each update and change had to be reviewed by the HPO and communicated clearly, efficiently and quickly to the HIPE coders. Edits on the national HIPE data entry system were developed to support coders.

Reviews of COVID-19 cases included the following:

- Ventilation:
    - Continuous Ventilatory Support (CVS) with 0 CVS hours reported or with 0 ITU days
    - CVS hours reported with no CVS procedure and 0 ITU days
- High % of clinically diagnosed COVID-19 versus Lab confirmed cases
- Patients with short LOS with HADx (hospital acquired diagnosis) flag assigned.
- Unspecified pneumonia code versus viral pneumonia code

Queries were issued to each hospital and followed up on promptly. Results highlighted areas where further education was needed and resources such as education sessions on COVID-19 were provided. Frequently asked questions were issued in Coding Notes (issued quarterly).

Results
Data needed to be checked regularly and queries sent to hospitals resulting in some needing correction. As HIPE data was used by a number of agencies there was more awareness and scrutiny of the data with the need to get it right first time.

Conclusions
Desktop reviews of COVID-19 data highlighted areas for review and some inaccuracies of data, a true indication of the coding quality will only be available by chart based audit. We will recommence audits shortly and may identify areas in coding accuracy not noticed by desktop review.

Challenges were identified in the reporting on cases admitted with COVID-19 versus hospital acquired. It is difficult to code hospital acquired COVID without supporting clear documentation and the hospital acquired cases reported on HIPE may not be a true indication of the actual numbers.

[a] Healthcare Pricing Office, Ireland

Improving cost and activity data quality in acute hospitals in Ireland

Mark O'Connor [a]

Introduction
The Healthcare Pricing Office (HPO) published the ABF Implementation Plan 2021 - 2023. One of the actions in this plan is to produce an Acute Hospital Costing and Activity Data Quality Development Plan. This is currently a work in progress and the presentation will reflect on the elements of data quality, the owners of each element and how they can be improved.

Methods
The HPO is engaging with different parties in the HSE on data quality. The HSE is implementing an Integrated Financial Management System (IFMS) as a single source of financial information to replace the multitude of individual financial systems. HPO Costing has employed mapping processes to standardise these systems and is providing input into using IFMS to standardise financial information and make costing easier to do.

HPO Costing has also conducted a survey of information systems available by hospital. This will detail the absence of standard national systems on which to collect patient encounters, the information gaps resulting and the effect on costing.

Results
The impact of IFMS is yet to be seen as it has not been implemented in any site yet. However it is still leaving hospitals autonomy in their enterprise structure. The HPO's experience of mapping the non-standard into standard will be essential in extracting organisational value from IFMS implementation.

The information systems survey is the first attempt by anyone in the organisation to develop a full picture of the systems in use and more importantly where no systems exist. The results will be shared with hospitals and HSE ICT to identify the information gaps existing . However the HPO does not have the means, or a budget, to implement systems to fix these gaps.

Conclusions
HPO Costing has produced a document 'The Case for PLC' which states that costing is an entire hospital enterprise. The Acute Hospital Coasting and Activity Data Quality Development Plan will reinforce the case that the HSE as an organisation needs to prioritise the capture and reporting of quality financial and patient information.

[a] Healthcare Pricing Office, Ireland

Improving the quality and reliability of Hospital Acquired Complications (HACs) coded data. A sustainable clinical governance approach to reducing HACs for clinicians and clinical coders.

Nicole Payne [a], Jennifer Nobbs [b]

Introduction
The best hospitals deliver high quality healthcare and improve patient outcomes by reducing preventable harm. The accuracy of clinical coding has a direct relationship with the overall quality of care, hospital funding, benchmarking and clinical decision making. A high priority area for many healthcare organisations is the clinical governance for Hospital Acquired Complications (HACs).

The Australian Commission on Safety and Quality in Health Care (ACSQHC) defines a HAC as a patient complication for which clinical risk mitigation strategies may reduce (but not necessarily eliminate) the risk of that complication occurring. Prevention of HACs is the most effective strategy. To achieve this, HACs data must be of the highest quality to maintain confidence in the data and access to a single source of truth. If the coding of HACs does not accurately reflect true incidence rates, mistrust

in the data can build with clinical governance programs then focusing on querying the data rather than the prevention of HACs.

Beamtree has developed a HAC management platform called RISQ. RISQ (Relative Indicators for Safety and Quality) is a comprehensive reporting, benchmarking and management tool to improve the quality and reliability of HAC data. Implementation of RISQ has led to increased trust in coded data by clinicians, an overall reduction in reportable HACs and greater collaboration between clinical coders and clinicians.

Methods
RISQ platform reviews coded episodes in near real time to assess the incidence of HACs and the underlying data quality of condition onset flag (COF) data, providing a method to measure and compare the relative safety and quality of performance for reporting, benchmarking, coding review, and clinical service improvement.

The platform monitors overall HAC rates, drills down into hospitals, specialities and individual clinicians. It reports actual and potential coding errors to the clinical coders. It allows clinicians to identify focus areas and to set targets, allowing health services to monitor improvements over time. It compares HAC performance rates with industry best practice. A key feature within the tool is the RISQ Coder Workflow. This workflow captures HAC documentation within the clinical record. This has resulted in better collaboration between the coders and clinicians by facilitating a seamless way to communicate with the clinicians and clinical coding teams to validate the reportable HAC.

Results
All hospitals within Australia utilising the RISQ platform have reported an improvement in the quality and reliability of coded data and a reportable reduction of HACs of between 16%-28%. This is due to improvements in clinical documentation, enhanced clinical coders knowledge of HACs and clinical service improvements as HAC data is now a trusted source of clinical information. RISQ underpins strong clinical governance processes for HAC management, which is sustainable and engages multidisciplinary teams.

Conclusions
The RISQ platform strengthens clinical governance and clinical coding processes for improved HAC data management. It supports hospital to achieve sustainable reductions in HACs by embedding improved practices for clinicians and clinical coders and a collaborative multidisciplinary approach to HACs which is underpinned by high quality and reliability trusted HAC data.

[a] Beamtree, Australia
[b] Beamtree, United Kingdom

Classification Development (4)

A Platform for DRG development with seamless integration of medical decision trees and cost calculation

Lukas Nick [a], Urs Gerber [a], Simon Hölzer [a]

Introduction
The SwissDRG system is developed and adapted yearly by SwissDRG Inc., a private company whose goals are set by a troika of the state, health insurance companies and healthcare providers.

The goal of the SwissDRG system is to

- ...cover the average yearly health cost of all Swiss hospitals,
- ...such that cost variance within a DRG is minimal and mean differences between DRGs are maximized (in other words by minimizing R^2),
- ...and to be comprehensible and transparent, i.e. the system must make sense in medical terms (as opposed to a purely statistical rule system).

To achieve this, the set of rules assigning patient cases to DRGs is based on medical reasoning and patient/cost data.

To adapt the DRG system to medical and population changes, SwissDRG Inc. annually collects the inpatients' biographical data, procedures and diagnoses and the corresponding cost data from all Swiss hospitals. Based on changes in the data along with change requests from the Swiss healthcare community, modifications are simulated and, if useful, integrated into the SwissDRG system.

We present a platform used to edit the medical decisions trees defining these rules and to calculate their "fitness", i.e. R^2 and cost coverage, among other statistics.

Methods
The platform is implemented as a web application based on React in the front-end, Ruby on Rails in the back-end, and a couple of Java services. The services communicate via JSON REST APIs.

Results
The health experts can modify the DRG assignment rules presented as decision trees. They can, within seconds, calculate the modifications' impact on the fitness of the system, based on a large patient/cost dataset (~1m cases). Even complex rules can be edited via a logical language used to express medical conditions. The results of the calculations are represented in different dimensions: statistics for an entire system, individual DRGs, the cost coverage impact on hospitals or certain types of hospitals, comparisons of these statistics between system versions, etc. Users can drill down from aggregated results to individual patient cases affected by the system's modification with a few clicks.

The introduction of this platform sped up system development because logical modification and calculation are integrated: evaluating the impact of a modification is a couple of clicks away. The process is significantly less error-prone, since many manual steps were automated. Each time a version of the system is saved, a set of validations is run to ensure no involuntary changes were introduced, and to warn users of potential inconsistencies. User satisfaction increased due to faster interaction, less waiting time, support mechanisms for editing logical expressions (syntax highlighting, auto-complete, error reporting), simpler management of system versions, including integrated documentation.

Conclusions
The platform significantly facilitates responding to urgent challenges and requests posed by the healthcare system, as recently proven during the Covid19 crisis. The system could easily be adapted to the needs of other healthcare systems or integrate medical logic of existing refined DRG systems.

[a] SwissDRG Inc, Switzerland

Refining admitted and acute care classifications in Australia: now and into the future

Anne Elsworthy [a]

Introduction
In Australia the Independent Hospital Pricing Authority (IHPA) undertakes the development of classifications across six patient service categories. This presentation will highlight recently finalised new versions of the classifications used in admitted care in Australia, outline a new platform for delivering education and briefly discuss opportunities that ICD-11 may provide in the future.

The following classifications are used in admitted and acute care:

- International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM)
- Australian Classification of Health Interventions (ACHI)
- Australian Coding Standards (ACS); collectively ICD-10-AM/ACHI/ACS
- Australian Refined Diagnosis Related Groups (AR-DRGs).

These classifications are not only used in Australia but are also licensed for use in 19 other counties.

ICD-10-AM/ACHI/ACS captures clinical activity in the admitted patient setting and underpins AR-DRGs that group similar admitted acute episodes of care to the resources required in treatment.

Subsets of ICD-10-AM are also used in classifications for the emergency and subacute and non-acute-patient service categories.

IHPA recently finalised the Twelfth Edition of ICD-10-AM/ACHI/ACS and Version 11.0 of AR-DRGs, in consultation with clinicians and health care sector stakeholders in accordance with a governance framework that sets out policies and principles for the development of the classifications.

<u>ICD-10-AM/ACHI/ACS Twelfth Edition</u>

Key updates cover:

- coronavirus disease 2019 (COVID-19)
- sepsis and antimicrobial resistance
- outdated mental health terminology
- placeholder codes for new health technology for mid-edition activation
- morphology codes alignment with ICD-O-3.2
- spinal interventions
- stem cell transplantation
- engineered cell and gene therapies.

AR-DRG Version 11.0

- new Adjacent Diagnosis Related Groups (ADRGs):
    - B08 Endovascular clot retrieval
    - F25 Percutaneous Heart Valve Replacement with Bioprosthesis
    - G13 Peritonectomy for Gastrointestinal Disorders.
- limiting sex as a grouping variable.

Other refinements have been made for currency using the most recent cost and activity data and cover review of the:

- complexity model
- splitting of ADRGs into end classes
- intervention hierarchy

IHPA has recently released interactive online education modules for Twelfth Edition on a new learning management system - IHPA Learn. The eLearning covers major updates in modules that are accessible, interactive, compatible on multiple devices and include quizzes and a certificate of completion.

Education modules for AR-DRG V11.0 are planned for release in August 2022.

What about ICD-11?

In developing ICD-10-AM Twelfth Edition IHPA aligned major updates with ICD-11 where possible. In the next development cycle IHPA will continue to update ICD-10-AM but will likely limit refinements to minor updates given ICD-10 is not being updated by the World Health Organization. Updates to the Australian Coding Standards and the Australian Classification of Health Interventions will continue as usual.

Limiting updates to ICD-10-AM will allow IHPA to invest in projects that will inform decision-makers on when ICD-11 may be suitable for implementation in Australia and include mapping between ICD-10-AM and ICD-11 and exploring opportunities for clustering; the ability to link codes in an episode to provide additional context and meaning.

Conclusions

IHPA will continue to refine and update classifications across different patient service categories and will look to opportunities that ICD-11 may offer to further refine classification development.

[a] Independent Hospital Pricing Authority, Australia

Saudi Billing System: designing a standardized health insurance billing system in Saudi Arabia based on ICD-10 AM/ACHI classification

Husein Reka [a], Abdullah Almaghrabi [a], Susan Young [a], Shabab Alghamdi [a]

Introduction

The Council of Health Insurance (CHI) in its efforts for more transparency and standardization, mandated a standardized billing system, in 2020, that replaced a variety of in-house non-standardized billing codes. The Saudi Billing System (SBS) is a modification of the Australian

Classification of Health Interventions (ACHI) classification system, modified and enhanced to serve the Saudi health insurance market for patient classification and billing purposes.

Methods
CHI conducted an assessment of available classification systems having in mind the current mandate in Saudi Arabia of using ICD10 AM/ACHI/ACS classification. Several systems were appraised such as ACHI, CPT, and MBS with the aim of selecting the best foundation to build a new comprehensive billing system for the Saudi health insurance market based on certain criteria (specificity, familiarity, existing license with modification rights, and ability to build fee schedule).

As part of this process, data was collected from 80 healthcare providers and the three largest health insurance companies (covering more than half of the market) totalling 2,231,017 health service encounters, out of which 105,165 (5.5%) outpatient visits and 3,054 (1%) of dental visits were re-coded respectively.

Since ACHI 10th Edition in the existing format could not produce complete itemized clinical and billing data, CHI developed and tested SBS covering all current health care services in Saudi Arabia, followed by an implementation guide and technical support for stakeholders.

Results
We analysed 1.4 million claims data from 4.9 million encounters. Sample size for coding and mapping to charge description master was 165,742 claims representing 447,503 encounters.

Out of this sample 48% of actual market services codes were mapped to the existing ACHI code set, leaving 52% of the services requiring new codes and descriptions. As part of this process original ACHI chapters were modified, additional chapters were added ensuring full compatibility with billing practice whether in the admitted care, outpatient or ambulance care setting. As a result of this work, we adopted 6,224 ACHI codes and created 3,219 new codes bringing SBS to a total of 9,443 codes.

This modification achieved a 100% fully integrated and coherent billing system for health care services in the Saudi Health Insurance Market. In parallel, CHI is currently l working on improving SBS through an established maintenance process.

Conclusions
Patient classification systems are powerful tools that standardize data and bring more transparency to health care provision. ACHI as a classification system presented the best foundations to build a new comprehensive billing system for the Saudi health insurance market (specificity, familiarity, existing license with modification rights and ability to build fee schedule) to address the requirements of a reformed and more value-based health insurance market.

Modifying ACHI and standardizing billing systems in the health insurance market is a building block toward more transparency and improving health care delivery.

Lastly, existing proven classifications are a good basis for modification and adaptation when faced with country and market-specific contexts for patient classification.

[a] Council of Health Insurance, Saudi Arabia

An integrated model for adopting AR-DRG's for publicly funded activity-based health insurance systems.

Winston Piddington [a], Christian Theodor Ulrich [b]

Introduction

The Australian Refined Diagnosis Related Groups (AR-DRG) system has been popular to adopt in publicly funded activity-based health insurance systems across the world due to:

- Clear resource homogeneity between diagnosis-related care groups - due to 27 years of slow and progressive development of the AR-DRG system in Australia,
- The low numbers of DRG's in the system (dependant on AR-DRG version being adopted),
- The ease in adopting the grouping into the four basic components of an activity-based health-insurance funding process (1. Coding and classification, 2. Costing, 3. Pricing and 4. Funding)

This paper/presentation is for countries that maybe considering adopting the AR-DRG for their health insurance system, as it explores these four basic components, but also discusses what other critical components countries may also need to adopt to ensure the right checks and balances in place for a sustainable health insurance system.

Methods

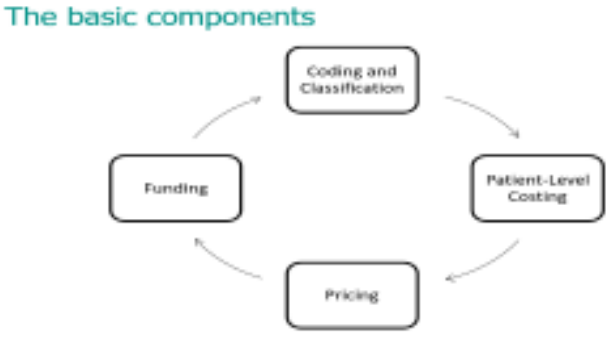
IQVIA are unique in that it is a true multi-national that is tasked (and trusted) to assist the development and adoption of country-wide healthcare funding systems. The company consults in numerous countries across the world, including Europe, the Middle East and Asia, as well as across Australia and New Zealand, and our consultants have gathered real-world examples of why more than the four basic components are required, and how adding further three 'critical' components can lower system-wide funding risk.

Results

In this presentation, IQVIA discusses these real-world examples and explains that, for an AR-DRG ABF system to work, it needs 7 key components closely integrated and working together to ensure health funding risk is balanced.

Of course, this starts with the four basic components (already discussed) - these being:

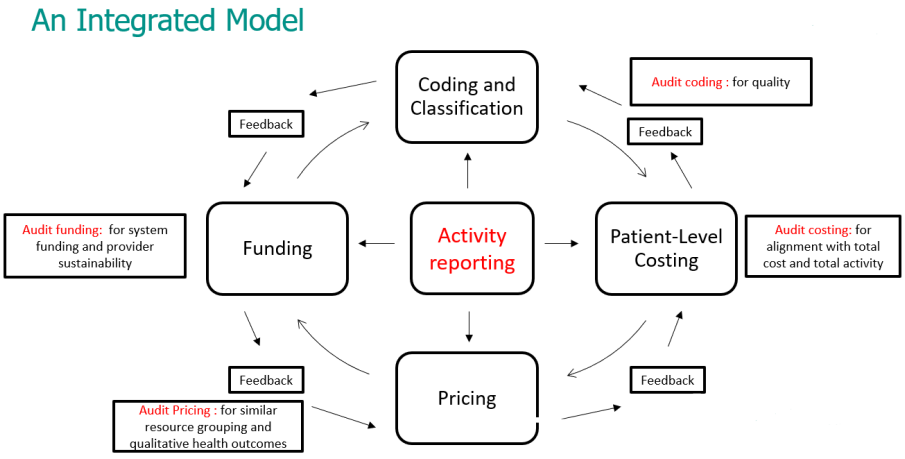
- Coding and Classification,
- Patient-level costing,
- Pricing, and
- Funding.



However, as well as these four 'basic' components, we also suggest that there are three other 'critical' components that are required for a successful system:

- A feedback processes between the four basic components
- An integrated activity reporting process, and a
- Audit process.

In the final paper/presentation we provide extended real-world examples from work that IQVIA consultants have completed around the world, as to why an 'integrated' model needs to be adopted, and how this model better deals with healthcare funding risks when all 7 key components are adopted.



Conclusions

After years of development in Australia, the AR-DRG system looks a simple, more realistic system to adopt than other systems around the world or can even be used as a 'scaffold' to build a country-specific DRG based ABF health insurance system. However, through IQVIA's work across the globe, we are suggesting that - via adopting a small number of extra modules in an ABF system - that a country can ensure it adopts (or builds its own) better a fairer health funding system, with adequate checks and balances in place, when it builds and integrates the 7 components' put forward in IQVIA's integrated AR-DRG ABF publicly funded health insurance model.

[a] IQVIA Denmark/Australia, Australia
[b] IQVIA Denmark/Australia, Denmark

Friday 30th September 2022 – Morning

Patient Costing

Using New Technology to Effectively Capture Residential Aged Care Costs

Patrick Power [a]

Introduction

Costing in a residential aged care setting is difficult due to the lack of resident-level activity data collected at the point of care, as well as the lack of available cost drivers that could be used to facilitate the costing process. This abstract describes how new technology is used to overcome these difficulties and provide meaningful costing results.

Healthcare costing is the exercise of matching the work performed, i.e., clinical activities, with the expenses incurred in producing that work, i.e., the dollars in the General Ledger. Costing acute patients is made relatively simple due to the various clinical activities that are recorded at the patient level, such as various charges for private patients and clinical activities such as Pathology, Pharmacy, Theatre time and Prosthetic charges for public patients,

Unfortunately, whilst aged care has guidelines for daily tasks, only clinical notes are recorded against each resident, and that information is not useful for costing purposes. As a result, previous residential aged care costing studies have relied on manual time studies, as a surrogate for actual recorded clinical activities.

Previous residential aged care costing studies have relied on manual time studies, as a surrogate for actual recorded clinical activities. Time studies involve the manual tracking of time spent in performing each activity and recording it against individual residents or groups of residents. This information is then used as cost drivers in the costing process. Without these cost drivers, all residents will be costed similarly using length of stay, regardless of the actual care provided.

This presentation will describe the processes used to implement a completely frictionless automated time capture study, along with manual recording of the clinical activity provided.

Methods

To overcome the manual data collection process, card technology was used to automate the recording of time. In addition, a simple user interface, using an iPad, was created to allow staff to easily select the clinical activity provided for each contact time captured by the system. Minimum distances between staff and residents were defined within the card technology, as well as minimum contact times, to minimise the recording of casual contact times, i.e., brief contacts where it was unlikely that a clinical activity was performed.

The costing results are then evaluated to assess the costs/benefits of a fully automated time capture, versus adding an additional manual process to obtain clinical activities. Similarly, their usefulness towards the future development of relative value units (RVUs) will be considered.

Results

The results will be presented in full at the presentation as the project will complete in July 2022.

Conclusions
The project's expected result is that the more manual the data collection process, the more user errors will be introduced into the data collection. The project will therefore aim to conclude whether a fully automated data collection process provides better outcomes to the costing process over one that holds more segmented data, albeit involving a manual collection component.

[a] PowerHealth Solutions, Australia

A review of the initial years of the national tariff structure TARPSY

Samuel Noll [a], Rémi Guidon [a], Sarah Haag [a]

Introduction
This paper provides a review of the main developments and challenges encountered in the initial years since the introduction of TARPSY, the national tariff system for psychiatric hospitalization used in Switzerland. TARPSY was first introduced for the remuneration of adult psychiatry in 2018. By 2019 it was extended for use in child and adolescent psychiatry and by 2020 for use in forensic psychiatry. Its development and maintenance is carried out by a non-profit corporation, SwissDRG Inc, which was founded by health insurance companies, healthcare providers and states/cantons. The tariff system is characterized by flat-rate daily payments which are monotonically declining with the length of stay in the psychiatric hospital.

Methods & Results
TARPSY was introduced gradually with a new version released annually. In the first two versions, patients were categorized into 19 patient cost groups (PCGs) based on their main diagnosis as well as further criteria such as complexity and severity of the psychiatric case and performed treatments. The third version of TARPSY introduced additional payments for specialized therapies such as planned trial leave and electroconvulsive therapy. The fourth version added two additional PCGs bringing the total number of PCGs to 21. Facilitating these improvements was the gradually increasing data quality. The number of Swiss hospitals delivering data as well as the number of cases passing plausibility checks increased each year. Additionally, data quality was further improved through the introduction of new psychiatry specific treatment codes (CHOP) by the Swiss Federal Statistical Office in 2018.

Conclusions
The approach with a limited set of diagnostic and procedure codes contributes to a broad acceptance by medical staff and healthcare providers. Overall, TARPSY's wide-ranging acceptance by all stakeholders in Switzerland suggests adapting it for use in other countries and other healthcare settings could be successful.

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Patient Costing Nursing Allocation Methodologies and its Impact on Patient Cost

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Introduction

Canadian hospitals report their financial and statistical data based on the Standards for Management Information Standards in Canadian Health Service Organizations (MIS Standards). These standards suggest that a time-based workload measurement system be used to allocate nursing services. Facilities across Canada that have implemented patient costing have used a variety of methods to allocate nursing costs to individual patients - for example, time-based workload measurement system, patient time, percentage staff time, acuity driven, etc. This project aimed to understand the variation of nursing cost allocation approaches and its impact on cost distribution. It is also sought to understand and explore how patient costing data is being used for management purposes.

Methods

A survey for patient costing facilities was developed through a collaborative process involving the Canadian Institute for Health Information, ministries of health and many stakeholders across Canada. The survey involved each facility indicating which allocation methods are being used in their nursing inpatient and ambulatory care departments as defined in the MIS Standards. Definitions were developed for allocation methodologies other than the recommended workload measurement system to inform the responses. The surveys were disseminated to patient costing facilities in four provinces across the country in 2019.

Results

The distribution of cost allocation methods was examined across various nursing inpatient and ambulatory care functional centres. For nursing inpatient functional centres, most facilities used patient time, with a few facilities reporting time-based workload measurement allocations to allocate nursing costs. Inversely, facilities reported mostly time-based workload measurement allocations for ambulatory care functional centres, with some reporting patient time.

Data from the Canadian Patient Costing Database (CPCD, 2017-2018) was used to examine the per diem cost variation between functional centres using different allocation methods. As predicted, there were more per diem cost variations in the functional centres that reported time-based allocations compared to those that reported patient time allocations. Therefore, there are differences in the variation in direct cost depending on the allocation method.

Conclusions

This survey allows us to assess the impact of the various allocation methodologies and determine that there is cost compression on a per diem basis. The project will also determine if that cost compression is also evident on the total cost for individual patients and for specific case mix groups. The next steps will be to determine the impact of such cost compression.

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Population Health

Understanding the Risk of Poor Coordination of Care in a UK Population

Alan Thompson [a], Stephen Sutch [b], Paul Molyneux [c]

Introduction

Population Health Management (PHM) is an approach aimed at improving the physical and mental health outcomes and wellbeing of people. A core part of the approach is to Identify 'at risk' cohorts using methodologies such as segmentation and stratification and in turn, designing and targeting interventions to improve care and support for people to improve outcomes.

This project built upon work undertaken by Dr Klaus Lemke and colleagues at Johns Hopkins University Bloomberg School of Public Health and the introduction of Coordination Markers into the Johns Hopkins Adjusted Clinical Groups (ACG(r)) System to identify populations that are at risk for poorly coordinated care. The basic premise behind the Coordination Markers is that individuals receiving poorly coordinated care have worse clinical outcomes and have higher medical expenses than individuals who receive coordinated care.

This study's objective was to ascertain whether the same variables that affect risk of poor care coordination in a US population create the same risk in a UK population and whether the weights associated with those variables needed to be adapted to account for differences in the way in which health care is delivered in the two countries.

Methods

An anonymised data set combining data from the GP record and hospital activity for approximately 175,000 patients was used in this study. It included a limited clinical profile of the patients including markers such total cost in the prior year, number of hospital visits and admissions and markers from the ACG System describing the morbidity burden, degree of complexity and risk associated with each person and data related to the four variables used to calculate the Coordination Markers, namely; Unique Provider Count, Generalists Seen, Specialty Count and Majority Source of Care. Sensitivity analysis was used to create the cut points for the final categories.

Results

Results will be shared that illustrate how patients are assigned to three Coordination risk categories of Likely Coordination Issues (LCI), Possible Coordination Issues (PCI) and Unlikely Coordination Issues (UCI). The outcomes in terms of cost, hospital activity and risk of future adverse events such as unplanned hospitalisations within each of the three categories will be presented. This includes complexity-adjusted comparisons to determine whether people with similar levels of morbidity burden/complexity had worse outcomes if they had been categorised as having Likely Coordination Issues compared to those that were assigned to the ICI category.

Discussion

The allocation methodology used to assign people to the three Coordination Risk categories appears to differentiate between those with lower costs and levels and activity and those with higher costs and higher levels of activity, with costs and levels of activity in those patients in the LCI & PCI categories are two to three times higher than those in the UCI category in segments with similar levels of complexity.

The Coordination Makers seem to provide a robust way of identifying a smaller percentage of people who have higher costs and levels of activity who should benefit from an intervention that improves the coordination of their care across multiple providers.

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Exploring primary health care EMR data and its impact on building population clinical profiles

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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 electronic medical records (EMR) for a sub-population who received primary health care (PHC) via community health centres in the POP Grouper. CIHI also evaluated the impact of including person-level social determinants of health (SDOH) captured in the EMR data to the overall performance of POP Grouper cost models and the predicted costs.

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 2017/18. The population of interest included individuals who visited a community health centre for PHC and where clinical and SDOH information was captured in their EMR.

Descriptive analyses were conducted to assess the impact of including EMR data on building population clinical profiles. Linear regression models were built to examine the effect of the SDOH variables on model performance and cost weights. The ordinary least squares estimation method was employed in fitting these models. These models used cost as the response variable and the predictor variables were age, sex, the 226 health conditions, the most influential 2-way health condition interactions, and the following SDOH variables: language, income, education, household composition and racial/ethnic group.

Results
With the addition of PHC EMR data, on average more health conditions and higher cost weights were assigned to a person's clinical profile. Inclusion of EMR data also moved a good proportion of the clients to a different or more severe health condition category. Regional population profile comparison showed that adding EMR data provided a more accurate picture of regional differences.

Analysis on the impact of adding SDOH predictors to the predicted cost models is still underway, and is scheduled to be completed by May 2022.

Conclusions
The pilot study showed that adding PHC EMR data enhances population clinical profiles by providing a more accurate picture of these patients health care resource requirements. Adding EMR data is also important for regional comparison and facilitates a more fulsome understanding of regional health needs.

The SDOH information adds valuable sociodemographic risk factors to the clinical-focused POP Grouper cost model. Work is still underway to identify if including SDOH variables in the cost models helps to further describe sub-population's (especially for vulnerable populations) resource requirements. The study will continue to be refined as more EMR data becomes available to CIHI.

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A Global Approach to the Dynamic Shift in Healthcare

Felisha Bochantin [a]

The command in outpatient care is in full swing, and it has drawn an increasing share of attention. Inpatient care, for over decades a core business for facilities, is now in decline. As the procedures are out-migrating from facilities to ambulatory and outpatient centers the technology will need to compete effectively in the outpatient arena.

The 3M HIS presentation will discuss the increasing shift of services from inpatient to outpatient settings and from outpatient to ambulatory settings, setting the stage for a complex strategic planning process. Key questions will be addressed regarding how we currently look at tracking the overall outpatient patient experience. Are we connecting the dots globally? Are we using the correct KPIs and are we using them consistently? In this presentation we discuss if the case mix is relative for outpatient services. By crafting an outpatient strategy, leaders should expand their perspective beyond simply attempting to win outpatient versus inpatient volumes and focus more holistically on offering a unified value proposition.

Regardless of the site of care, consumers should want to choose their system carefully. Achieving this value proposition is no easy feat, and hospital and health system leaders will have to evaluate an array of factors to do so, 3M offers a wide range of population health grouping methodologies, including the following:

- Ambulatory Potentially Preventable Complications (AM-PPCs) Classification System. This clinically based methodology identifies ambulatory surgeries/procedures with patterns of complication of care, based on computerized discharge abstract data. The output from the AM-PPCs Classification System can be used to compute complication rates for facilities and providers. Higher than expected complication rates may indicate opportunities to improve the quality of procedures being performed on an ambulatory basis.
- 3M IR-DRGs are used by researchers, hospitals, outpatient/ambulatory facilities worldwide as a part of their funding systems and for budgeting, outcomes analysis, benchmarking, and performance measures. The system compares resource consumption across facilities and regions, supporting local and national health system management.
- 3M CRGs are also useful as they are patient-centric, focus on the total burden of illness rather than one disease or service, and use a categorical approach to patient classification that provides clinicians with actionable data.

We will examine how these methodologies can assist in connecting the dots across population health spectrum including various healthcare settings.

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Data Quality (2)

The dog bit the man, or was it the other way around? Maintaining the syntax of patient record narrative in coded reporting

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Introduction

The narrative text in the patient record shall be converted into codes for reporting to statistical analyses. In some natural languages, certain information is captured by pre- or suffixes attached to particular words (example: grammatical cases in German or Latin languages) while in other languages such as English or Swedish, the order of the words in a narrative text, the syntax, may contain similar specific information that is not contained in the individual words (example: "the dog bit the man" versus "the man bit the dog").

The classical way to code medical information for statistics has been to focus on epidemiology and report the underlying cause of disease as the main focus. However, in modern medical practice, there is a tendency to focus information on the reason for activity at the present encounter instead of on the underlying cause of disease.

Methods
The International Classification of Diseases and Related Health Problems (ICD) has mechanisms to capture the differences of a focus on the underlying cause versus focus on a certain manifestation of disease. One important example is the dagger and asterisk system presented in the ICD-10. Initially the asterisk component (the manifestation of disease) was regarded as a supplementary information to the dagger code (etiology) but after international discussions in the WHO-FIC Update and Revision Committee 2007-2008 it was decided that the narrative focus in the records should be reflected in the sequence of codes in the dagger and asterisk system.

Results and Conclusions
Example of this important change can be visualized as follows:

1. The patient has Type 2 Diabetes Mellitus with diabetic complications.
   A patient who is treated for Type 2 Diabetes mellitus and has diabetic ophthalmic complications is coded E11.3 which is the focus on the endocrine disease
2. The patient has complications due to Type 2 Diabetes Mellitus.
   A patient treated by the ophthalmologist for a diabetic retinopathy (due to Type 2 DM) is coded H36.0* E11.3†.

The syntax (sequence) is important and the opportunities for expressing detailed information with extension codes as well as the sequence of codes is greatly expanded in the revised and updated version of the International Classification for Diseases , the ICD-11.

More examples and discussions will be presented.

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Moving data collection from a “vicious” to a “virtuous” cycle – a cycle of continuous improvement

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Introduction
Sound data that reflects the activity in the health sector is essential to understanding what is happening to patients and how the sector is responding to their needs.

Sometimes where the data are not used because the potential users, such as clinicians, researchers and managers, think that the quality of the data is not sufficient to support good decision making. This line of thinking produces a vicious cycle. The clinicians, clinical coders, managers, and data custodians who are responsible for originating and collecting the data cannot see that their effort is

contributing to improving patient care and public health decision making. How can these data collectors maintain their motivation and commitment to producing high quality data if it is not used? Consequently, the quality falls even further.

The challenge is how to turn this vicious cycle into a virtuous cycle.

Methods
The foundation of our insights into these issues is work conducted over the last 10 years reviewing data collection processes, their impact on the quality of the data and establishing best practice.

The methods included detailed reviews of the original data sources, the quality of the collected data, benchmarking of processes, and interviews with data "stewards" and "custodians".

These insights were refined through hundreds of workshops with clinicians and the collectors of the data in developed and developing health sectors.

Results
Factors that influence and support high quality data collections include, the physical and system elements, the training, reward, and career pathway available to data collectors, regular auditing, cross checking of the validity of the data from other sources and promoting the use of the data with appropriate feedback loops.

Clinicians are vital in the process of accurately recording what happens to the patient and to making the best use of the data, a cycle in itself.

The paper will explore the use of the data for many purposes, including as the basis for payment, comparison of clinician and hospital/facility performance, consumer feedback and public health decision making.

Novel approaches to using the data will be discussed including using a robust data set from one country to fill in the gaps in data in other countries where the same type of data collection is less well developed.

How much of our resources should we spend chasing high quality data? Is there a point of diminishing returns and where is that point? Data accuracy comes at a cost. Moving ahead with slightly dirty data may be a good choice if the limitations are acknowledged.

Conclusions
This paper argues that the key to turning a vicious into a virtuous cycle is the timely use of the data by clinicians and other decision makers. Various methods for stimulating the use of the data and improving data quality will be discussed.

Much can be done to improve the quality and usefulness of the data we collect from the health care system. Using the data in interesting and important ways is of primary importance to improving our health data collections.

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Improving data quality by conducting systemic changes in the collection process: perspectives from the French Technical Agency for Information on Hospital Care.

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Introduction

In France, health data is generally collected in hospitals on a monthly basis for funding and evaluation purposes since 1996. The Technical Agency for Information on Hospital Care (ATIH) sets up the coding rules and the specifications of the data formats once a year. The primary data collection consists of discharge summaries (diagnoses, procedures), administrative and billing information of every hospital stay and every sector (public/private). Many costly drugs and their indications, and implantable medical devices are also included in the mandatory datasets. As researchers and policymakers set up new quality assessments and develop new funding models, the demand on hospital data collection increases and becomes more complex. Over the last ten years, the ATIH has added 11 datasets on top of the primary data collection representing around 190 more variables at the patient's level, with new data types such as biological results, follow-up data for selected conditions or treatments (chronic kidney disease, cancer medication, gene therapy), and patients' satisfaction. However, the exhaustivity and quality of these "new datasets" is low, resulting in a low exploitability. The increasing demand for data is currently impeded by the heavy reliance upon clinicians/care teams and manual data entries.

Methods

The ATIH has conducted a threefold study to describe the main obstacles and incentives to producing data collections. The first one consisted of a dozen field interviews with medical information teams and a quantitative online survey of 1427 healthcare institutions conducted in January 2022. The second one consisted of six interviews with the most established or innovative publishers of health information systems (HIS), and the analysis of the French national database on HIS software companies implemented in hospitals. The third one consisted of 7 interviews with national and local organizations in three countries (Australia, Denmark, England). A report was provided and several cross-cutting workshops were organized at the ATIH to identify priority areas for action.

Results

The first performance leverage concerns the adaptation of HIS within hospitals. The importance of good coordination of the information producers within institutions and the adaptation of software tools are crucial. Unfortunately, the short timeframe imposed by the regulations strongly constrains the ecosystem's players in their ability to adapt to the information system.

The second determining factor concerns the data flow from medical or administrative patient records to data production software. The study highlighted the atomisation of the publishers' market: a vast number of software solutions, covering more or less functional domains with few data standards, resulting in a very low level of interoperability and implying a significant amount of manual reprocessing, mainly via Excel.

Conclusions
The ATIH has identified several actions to design more efficient medical information collection processes related to new requests, from the urbanization of HIS to semantic interoperability, to simplify the production of medico-administrative data collections to alleviate the burden of clinicians and care teams.

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Analysis of Casemix Data (2)

Disease and economics burden of five ENT procedures in a teaching hospital

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Introduction
Although ENT cases were only 2%, they usually fell under secondary diagnosis and under-reported. Meanwhile, tonsillectomy was found to be common in Malaysian Government Hospitals. This study aims to establish the disease and economic burden of five most expensive procedures according to expert at one of the teaching hospitals in Malaysia.

Methods
Retrospective data from electronic medical record for ENT admission in 2020 were obtained. Information related to admission such as primary data and secondary diagnosis and free text procedures were extracted. The data was coded by trained coders which combine both ICD-10 for the diagnosis and ICD9-CM for the procedures and imported into a case-mix grouper to generate the DRG codes. Simultaneously, clinical pathway for the five procedures were collected from experts. Following the clinical pathway, bottom-up costing approach was conducted to estimate the healthcare resource utilisation. The Average Length of Stay (ALOS) was based on clinical pathway, not on patient level data. The cost data were reported in US$, the price year 2020.

Results
Among the total ENT in-patient cases, there were 19 tonsillectomy cases, 31 tracheostomy cases, 4 FEES cases, 27 radical neck dissection cases, and 0 cochlear implant cases in 2020.

The most common DRG for tonsillectomy was Tonsil & Adenoid Operations - Minor (U-1-15-I) (n = 16 (88.89%)). The mean ALOS was 3.34 days. The range of LOS = 3 - 35 days. The mean age = 37.61 years old (Range: 13 - 72). The male patients were 8 (44.44%) and the female patients were 20 (55.56%).

The most common DRG for tracheostomy was Other Ear Nose Mouth & Throat Operations Minor (U-1-20-I) (n = 10 (32.23%)). The mean ALOS was 6.8 days. The range of LOS = 2 - 109 days. The mean age = 53.52 years old (Range: 19 - 85). The male patients were 20 (64.5%) and the female patients were 11 (35.5%).

The most common DRG for radical neck dissection was Other Head & Neck Operations - Minor (U-1-11-I) (n = 15 (55.56%)). The mean ALOS was 6.53 days. The range of LOS = 1 - 50 days. The mean age = 48.36 years old (Range: 0 - 88). The male patients were 283 (56.9%) and the female patients were 214 (43.1%).

For FEES cases, the mean ALOS was 5.5 days. The range of LOS = 3 - 7 days. The mean age = 72.25 years old (Range: 66 - 78). The male patients were 3 (56.9%) and the female patients were 1 (25%).

The cost for the five procedures based on ALOS of 3 days; tonsillectomy, tracheostomy, radical neck dissection, FEES, and Cochlear Implants; were US$755.39, US$1,106.96, US$1,350.66, US$875.92, and US$1,571.39 respectively. The total cost for the total procedures conducted in 2020 were US$14,352.41, US$34,315.76, US$36467.82, US$6,285.56, and US$0.00 respectively.

Conclusions
In conclusion, although the statistics for the 5 procedures were small and the cases were minor cases, they incur huge amount of resources. Hence, this study can be used to perform better budget planning especially for ENT department. (486 words)

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Rapid diagnostics in gastrointestinal infections to avoid unnecessary costs for isolation

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Introduction
Gastrointestinal infections (GI) provoke inflammation of the gastrointestinal tract (gastroenteritis). They are caused by viruses, bacteria or parasites. Symptoms include diarrhea, vomiting, and abdominal pain. The main danger of GI is dehydration, which is why an intake of sufficient fluids is important. GI are among the most common infections in primary care. Although not all disease progression is fatal, GI can be dangerous in a particular medical setting or for certain patient populations. Some GI are particularly easily transmissible and therefore special rules apply here for handling these patients

Patients who are admitted to hospital in Germany with a suspected GI are usually isolated temporarily until definitive findings are available. The duration from the time of swabbing for a stool sample to the laboratory result varies between 48 and 72 hours. A patient may only be de-isolated if there is a finding that does not require isolation.

The polymerase chain reaction (PCR) based analysis panel makes it possible to obtain a laboratory result within a short time. Depending on the hospital-specific situation (location and operating hours of the laboratory), a result can be available after only a few hours (the test duration itself is approx. 1h) and provide information on the need for isolation. In addition, earlier specific treatment of the infection is possible.

In the analysis, a cost-benefit model was developed for a GI panel to provide hospitals with a valid economic decision-making basis for the cost-benefit ratio of rapid diagnostics.

Methods
Patients were grouped in:

- Non-infectious patients which were wrongly isolated (on suspicion) after results of the tests were available
- Patients with GI which were isolated correctly
    - GI Patients with no clostridioides difficile (C. diff.)
    - C. diff. patients on normal ward
    - C. diff. patients on intensive care unit (ICU)

To determine the effects of the new panel, the rate of cases with pathogens not requiring isolation was determined. Furthermore, the average isolation time with conventional testing was compared to the average isolation time based on PCR.

To determine the average costs of the individual patient groups, cost data was obtained by the German Case Mix Office. For each relevant DRG, all costs were broken down to a daily basis to be able to simulate the effects.

Results
In 2020 there were 147.000 cases of GI in Germany. Approximately 30% had an infection requiring isolation. In total, there were about 17,000 cases with C. diff. infection, 6.5% were treated on ICU. Assuming that the results of the PCR test is available within 7 hours instead of 48 hours and that the new panel shows an overall reduction in length of stay of 1.49 days. The total cost per case is reduced from € 1,780.69 to € 1,232.26 when using the new panel. The cost of isolation decreases from € 265,00 to € 42,00 per case.

Conclusions
Rapid diagnostics proves again that higher test costs are offset by lower overall costs. This has already been investigated and confirmed in studies.

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Admission and discharge management and related cost differences of dementia patients in Swiss psychiatric hospitals

Elena Bleibtreu [a], Irene Salvi [a], Alexander Geissler [a]

Introduction
Dementia is the seventh leading cause of death globally. Besides age, mental illness is known as an important risk factor of dementia and therefore respective patients are often treated in psychiatric hospitals. In order to allow for a management of the treatment pathway and to gain insights on relevant cost structures, knowledge about the care situation before and after the hospital stay is important.

In 2018, the DRG-based tariff structure for psychiatric hospitals (TARPSY) was implemented in Switzerland. The tariff implementation supports improvement of documentation and data quality. It can make an important contribution to the understanding of the care situation of patients as specific variables (e.g., admission type, referring institution, decision for discharge) need to be recorded by the hospitals and are audited by the insurance companies.

In this paper, we first provide insights on the care situation of dementia patients before and after

hospitals stay. Then, we investigate if admission and discharge variables explain differences in costs. If so, they could be considered for the further development of the tariff structure and management of patient pathways. With our research, we aim to contribute to the health policy discussion on management of dementia patients and facilitate the further development of the tariff structure for this patient group.

Methods
This analysis is based on data at the case level from the Swiss Federal Statistical Office, including diagnoses, procedures, detailed cost information, and other patient characteristics. For our analysis, we select the psychiatric cases with main ICD-10-GM diagnosis F00, F02, F03, and G30, G31.

Our final sample comprises 7,090 cases of dementia from 2017 to 2019. To explore the relationship between the admission and discharge variables and the case costs (or different types of costs on the patient level), we apply an OLS regression.

Results
Based on the current and available literature our hypotheses are:

- There are differences in the care situation of dementia patients before and after their psychiatric hospital stays at the cantonal level (i.e., at the regional level).
- There are differences in the care situation at the hospital typology level (e.g., differences between university hospitals, regional hospitals, etc.).
- For severe cases of dementia, we expect more referrals by physicians or referrals from acute hospitals.
- We expect cost differences between patients admitted and discharged in different ways.

We will analyze the hypotheses with the outlined data and methods.

Conclusions
The quality of the data on psychiatric patients is beginning to improve thanks to the new TARPSY tariff structure introduced in 2018. Thus, we get better information about the care situation of dementia patients before and after their stays in inpatient psychiatric hospitals. This information can be used to optimize the inpatient and outpatient care of dementia patients. Further, a better knowledge about the interrelation between inpatient and outpatient care can help further improving the tariff system.

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Using Casemix System Data in Estimating Economic Burden of Influenza Among the Elderly

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Introduction
Influenza is an infectious disease caused by a range of influenza virus may cause life-threatening complications among the high-risk groups especially the elderly. The condition is preventable with effective vaccination programme. Estimation of the economic burden are essential to guide policy makers in establishing the influenza vaccination program, especially in resource-limited settings. Casemix system data base with extensive costing information is an excellent source of information for estimating economic burden of influenza. The aim of the study was to estimate the economic

burden of influenza from the provider's perspective among elderly in Malaysia.

Methods
MY-DRG casemix database in a teaching hospital in Malaysia from 2010 to 2020 with 16 clinical and non-clinical variables was the main source of data in this study. Cases with principal diagnosis or secondary diagnosis coded in ICD-10 as J09, J10.0, J10.1, J10.8, J11.0, J11.1, J11.8, J12.8 and J12.9 that represent influenza and its complications were included in the study. Direct cost of influenza disease for all severity level, adjusted for year 2020 tariff, was calculated from the casemix data and guided by clinical pathway developed by experts. Two outpatient visits prior to hospital admissions were assumed to calculate the annual cost per patient. Sensitivity analysis was conducted to assess the impact of variations in costs and incidence rate of influenza for both costing approaches.

Results
A total of 1,738 cases of influenza were identified from the casemix database. Most of the cases were less than 18 years (91.2%), while only 79 cases (4.5%) were among the elderly. Severity level 1, 2 and 3 cases were 56.5%, 35.1% and 8.4%, respectively. Top five MY-DRG casemix groups were J-4-16-I (Simple Pneumonia-Mild; 50.9%), J-4-16-II (Simple Pneumonia-Moderate; 13.6%), J-4-18-II (Asthma & Bronchiolitis-Moderate; 12.7%), U-4-13-I (Upper Respiratory Tract Infection & Otitis Media-Mild; 2.8%) and J-4-16-III (Simple Pneumonia-Severe; 2.8%). The average cost per admission for mild, moderate, and severe cases was RM3,677 (USD 876) RM4,200 (USD 1,000) and RM 7,087 (USD 1,1688), respectively. Average annual direct costs of managing mild, moderate and severe influenza were estimated to be RM2,435 (USD 579), RM6,504 (USD 1549) and RM13,282 (USD 3,163), respectively. The estimated total annual economic burden of influenza among the elderly aged 60 years and above in Malaysia was RM3.28 billion (USD 782 million) which is equivalent to 10.7% of MOH budget for 2020. Sensitivity analysis indicated that influenza incidence rate and cost of managing severe influenza were two most important factors that influence the total economic burden.

Conclusions
Overall, our results have shown that influenza is responsible for a substantial economic burden in Malaysia. The high cost of influenza suggests that further efforts are required to implement preventive programme such as immunisation in the elderly to reduce the disease and economic burden.

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Posters

Introduction of the payment for performance model in acute hospitals in the Republic of Serbia

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Introduction

In the Republic of Serbia, the NHIF is the dominant buyer of services of publicly owned health institutions with the application of historical budgeting, which means that it concludes a contract with hospitals based on the contract from the previous year. Currently, the RHIF transfers money to hospitals in the form of line budget, which greatly limits the work of management, given that there is no shifting of money from one line to another. An additional, existing circumstance is that the budget of hospital is determined on the basis of its capacity (beds and staff). After several years of preparation and implementation, as of January 2019, the DRG payment model has been applied. A 6.0 version of the Australian classification is used, which also has accompanying software for data grouping. As implementation is gradual, currently 95% of the financial resources defined in the budget are transferred each month to health institutions by purpose, while the remaining 5% of financial resources is a variable part of the budget and its payment depends on the DRG performance (4%) and quality indicators (1%) (Graph1). All 57 public acute hospitals are funded under this model (Graph2). Implementation, analysis and further improvement are carried out within the Second Serbia Health Project of the MoH.

In addition to the DRG effect of hospitals, a mechanism for measuring the performance of attending physicians has been created (Graph3). The mechanism is centralized, as for the performance of hospitals, it is determined in the NHIF on the basis of data from the invoices.

Methods

Descriptive statistics, Description of data analysis results

Results

Effects of DSG payment model:

- Reduction of ALOS (2018: 5.5 days, 2019: 4.8 days, 2020 before COVID : 4.2, 2021: 4.3) (Graph4)
- Increasing the sameday hospital services (Graph5)
- Issuance of centers of excellence

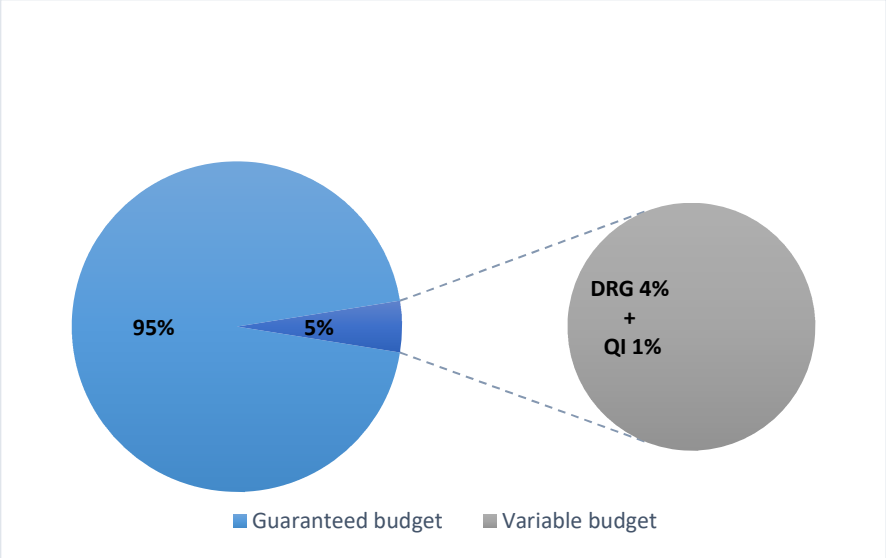
COVID pandemic has a strong impact on hospitals performance:

- Decrease of the case-mix index (2019: 1.7, 2020: 1.2, 2021: 1.3) (Graph6)
- Decrease in the number of hospitalizations (2019: 1.63M, 2020: 1.28M, 1.32M) (Graph7)
- Significant decrease in the volume of elective surgical procedures (consequently the creation of a waiting list) (Graph 8)

Conclusions

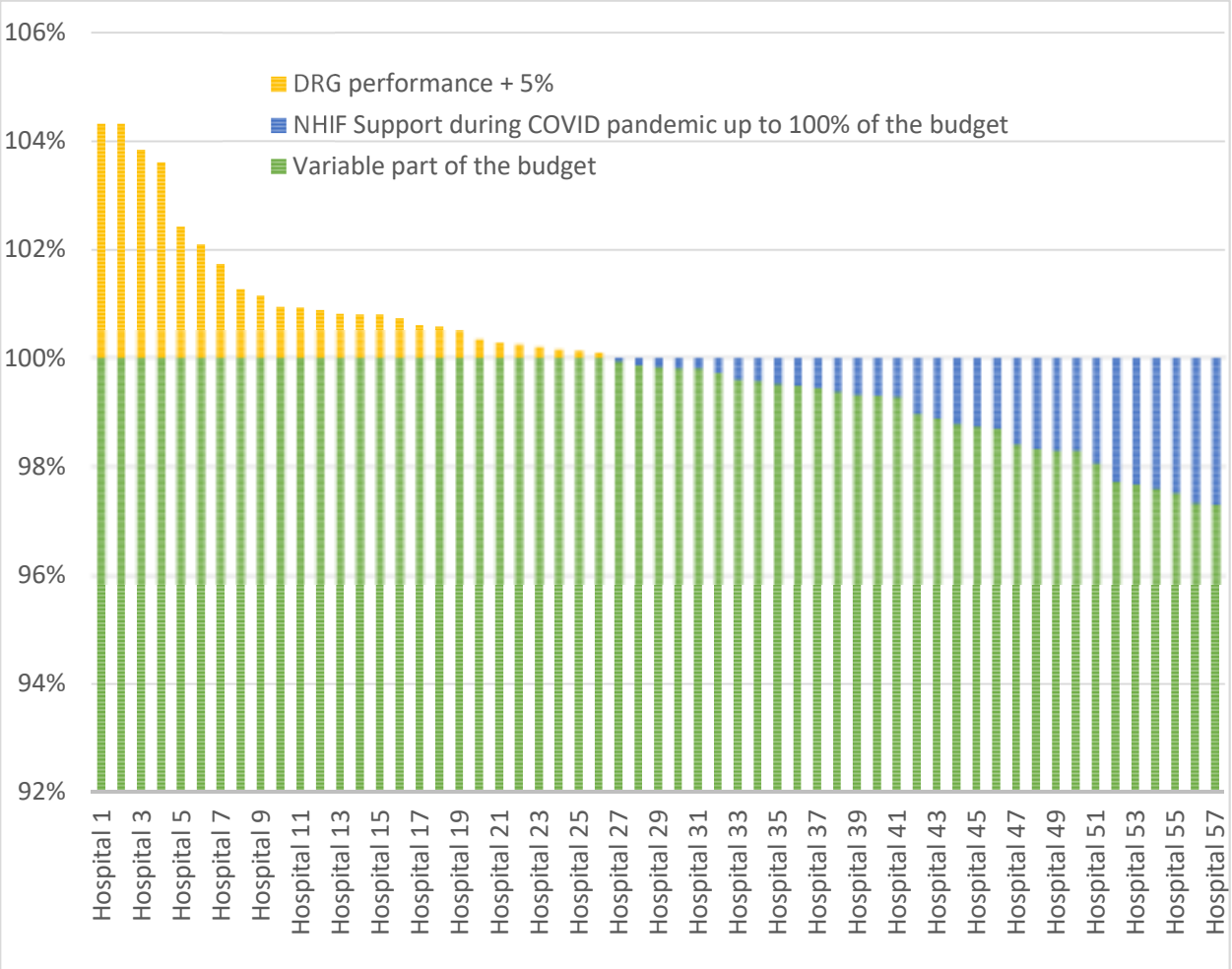
Despite the deviations caused by COVID, payment for performance model has led to positive effects on hospital operations. The next steps to improve the payment model are to increase the variable part of the budget of hospitals affected by the DRG performance, abolish the line budget and introduce a program budget based on efficiency and quality of health care (treatment outcomes).

Graph1 – Hospitals payment model

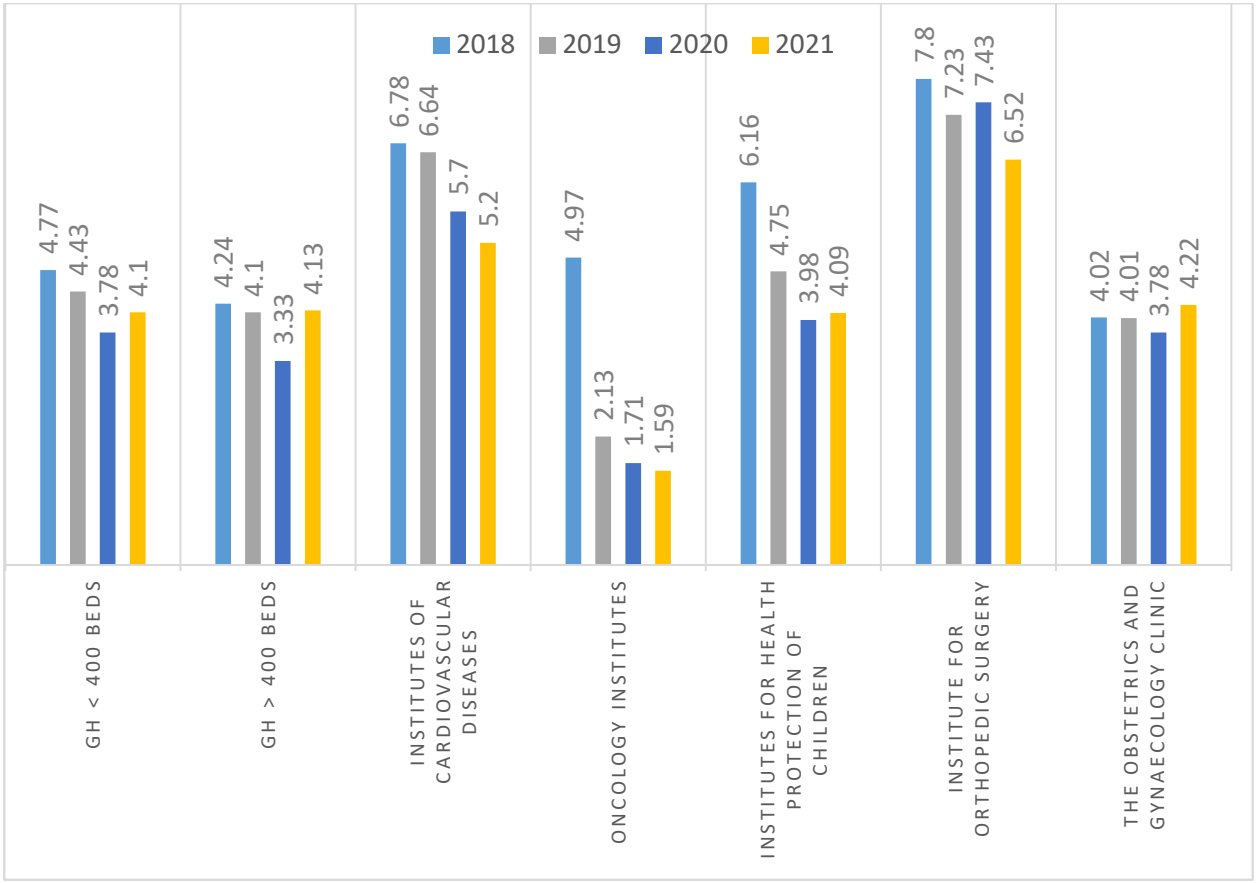


Quality Indicators
Average Length of stay
Percentage of outpatient visits by doctor
Reason for hospital admission
Percentage of day cases
Percentage of patients treated with "reserve antibiotics"

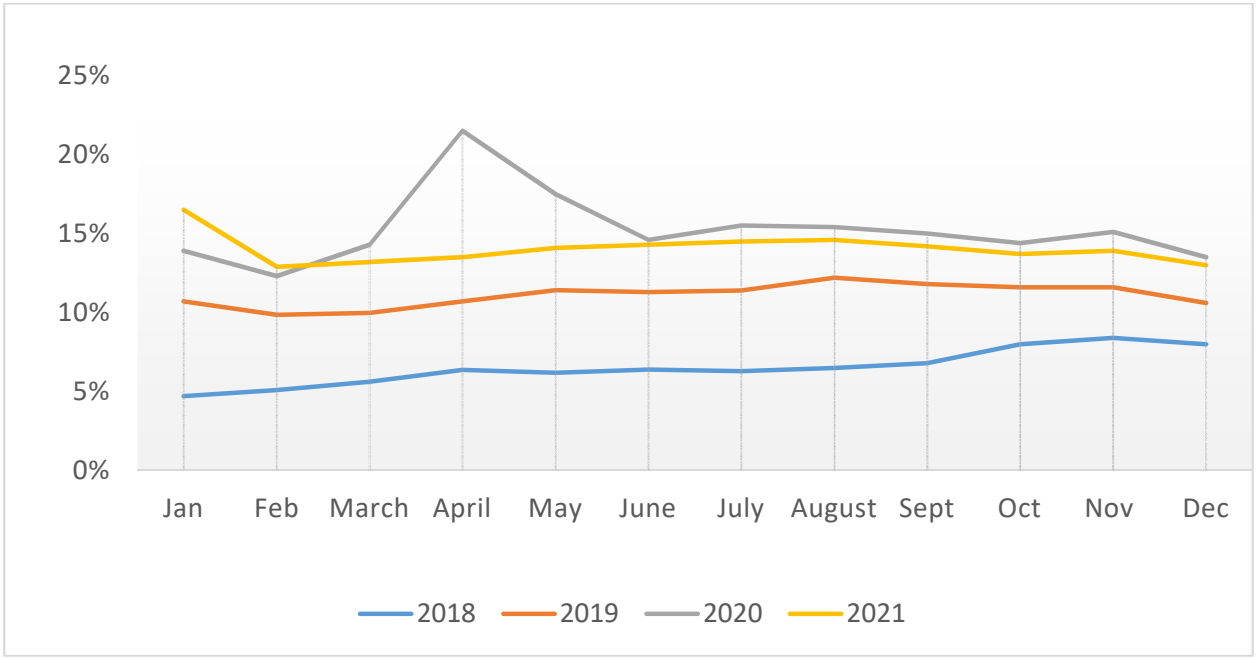
Graph2 – Hospital's budget



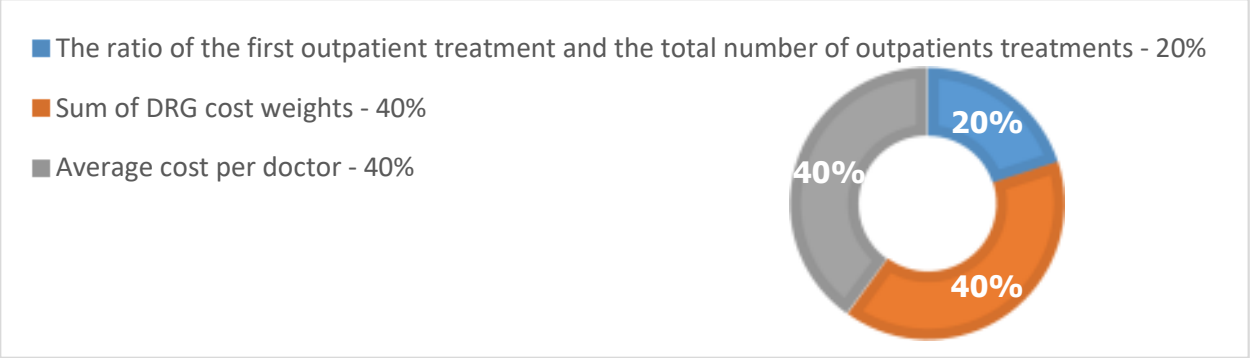
Graph4 – ALOS



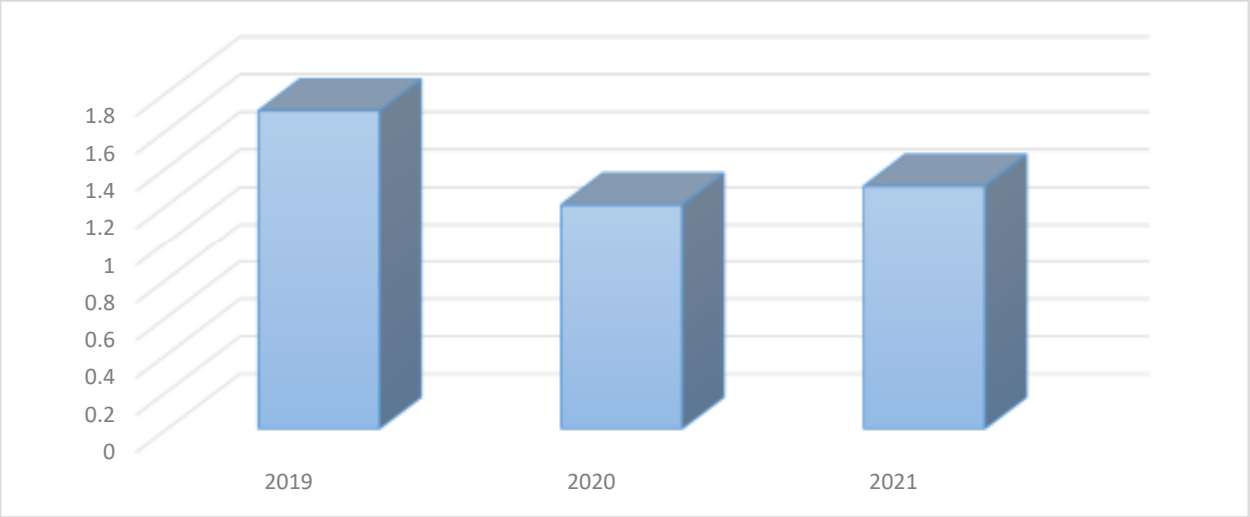
Graph5 – The share of the same day services in total number of episode care



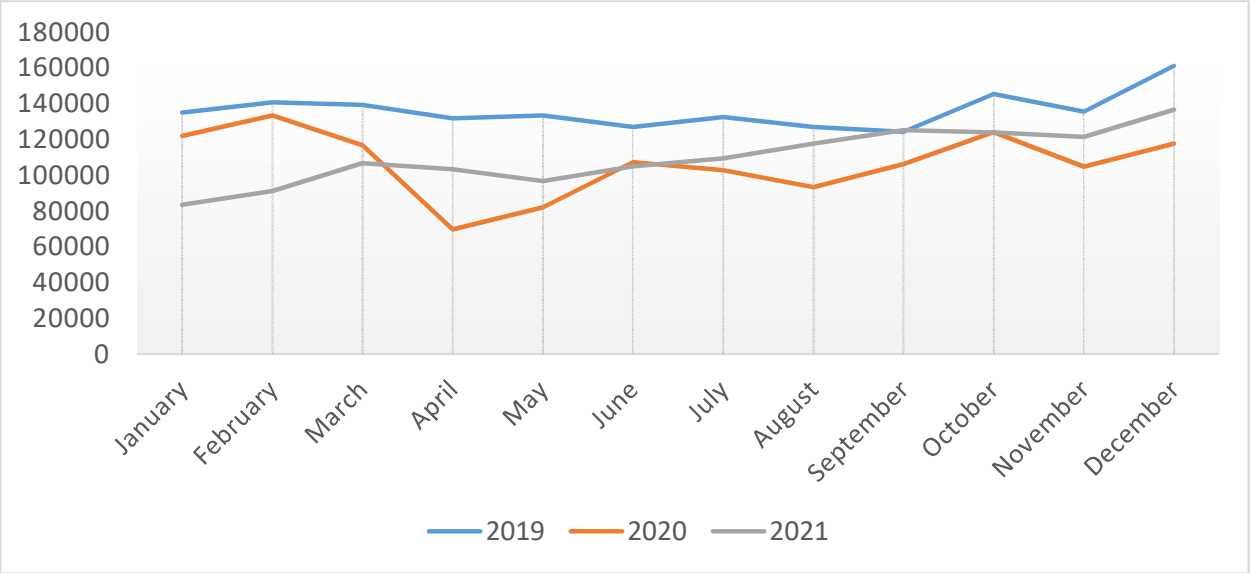
Graph3 – Doctor's performance measurement – criteria



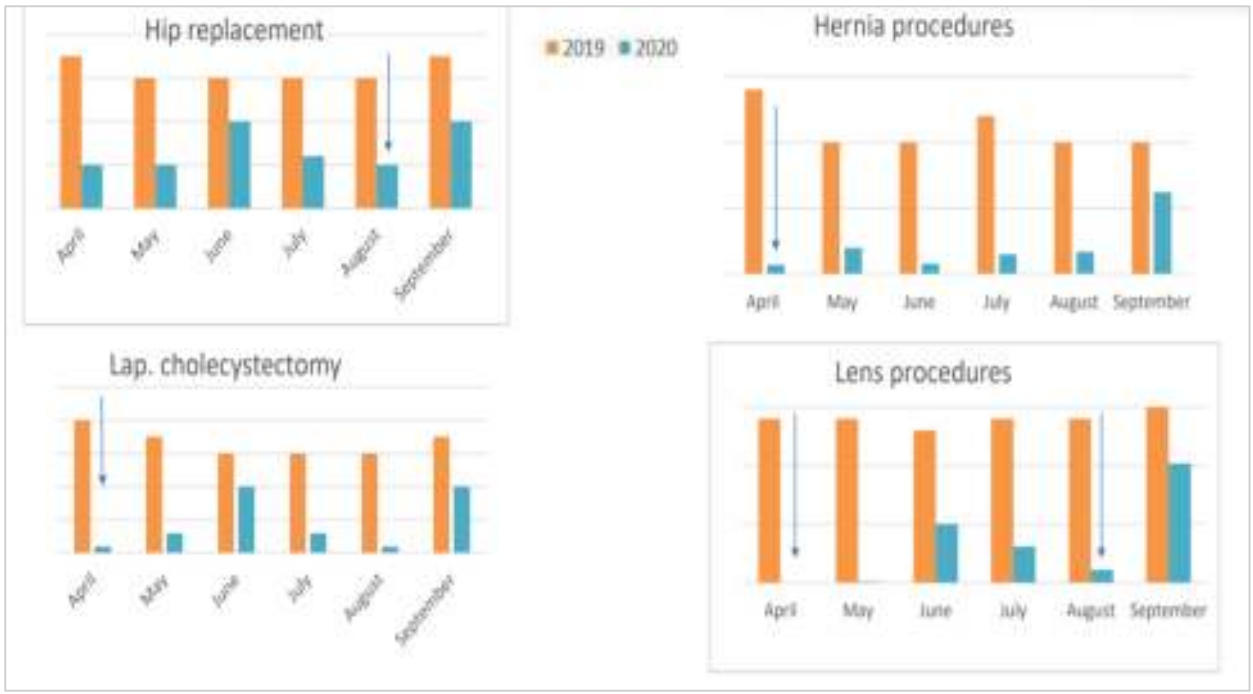
Graph6 – Case-mix index



Graph7 – Number of episodes of care (DRGs)



Graph8 – Elective surgeries



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ClinCode - Computer-Assisted Clinical ICD-10 Coding for improving efficiency and quality in healthcare

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

Introduction

Manual ICD-10 diagnosis coding is time consuming and error prone (up to 20-30 percent errors) according to studies in Sweden and Norway. Lots of unstructured data is stored digitally in large Electronic Patient Records systems. Simultaneously, Natural Language Processing and Artificial Intelligence methods have shown their efficiency in various text processing tasks, such as text classification, topic modelling, machine translation, text summarisation and others. These factors combined have made it possible to create a Computer-Assisted Clinical Coding (CAC) tool for ICD-10 codes that suggest codes to the discharge summary.

However, a number of challenges still exist, especially for minor languages like Swedish and Norwegian, primarily driven by inaccessibility of clinical data for training data-driven algorithms. Deep learning methods using large language models are investigated as potentially useful tools for training CAC models. The objective of the current study was to document the feasibility of predicting ICD-10 blocks from Swedish discharge summaries, towards a future pipeline designed to predict the full code.

Methods

The data contains 6,062 Swedish discharge summaries from 4,985 unique patients with 263 unique ICD-10 codes in the Gastro surgery medical speciality. The data is divided into ten logical blocks: K00-K14, K20-K31 up to K90-K93. The data have been used to fine tune a clinical language deep learning BERT model called SweClin-BERT encompassing two million patients.

To obtain better training data for ICD-10 coding a set of Norwegian 4,799 discharge summaries have been re-coded with the correct ICD-10 codes. This data set will also be used to predict ICD-10 codes.

Results
The results show an F1-score of 0.835 for the prediction of ICD-10 at 10 block level using the clinical language model SweClin-BERT (Lamproudis et al. 2022).

A web based demo called ICD-10 coder[1] has been created to demonstrate the code assignment. see Figure 1. However that model is based on KB-BERT a general Swedish Language model that does not contain sensitive personal information, (Remmer et al. 2021).

Fig 1. The web based ICD-10 coder.

Current coding practice is error-prone. An analysis of all discharge summaries from a Norwegian Gastro Clinic over the course of 3 years (3,554 patients) showed an Inter Annotator Agreement in Kappa value of 0.66 for the whole code-line and 0.7 for the main diagnosis isolated. Kappa values are not directly translated to percentages, but the results correspond to a moderate agreement where 35-63% of the data are reliable. A large portion of errors came from misregistration of complications.

Conclusions
It is shown that automatic assignment of ICD-10 codes is feasible using machine learning and creates plausible results at least at 10 block level.

Prediction at the block-level was an important preliminary step in the project. Experiments are continuing, using recent advances in deep learning and fuzzy logic, to improve results and specifically in predicting unique full codes, as well as developing the mechanism for explaining which words in the discharge summary give the highest weight for the prediction of a specific ICD-10 code.

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Challenges of the calculate a tariffs of services in the polish health care system based on the respiratory diseases

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Introduction
Since 2015, respiratory diseases have become the third (after cardiovascular diseases (CHUK) and neoplastic diseases) group of causes of all deaths in Poland. Their share is currently at the level of 7%. The total amount of expenses for benefits from section D: Respiratory diseases is 6.0% of the value and 5.9% of the number of all JGP services, which is one of the objective criteria for including a given group in the Tariff Plan, which include: financial significance for health care system, social costs and significance from the point of view of the priorities of the health policy of the state. The main purpose of the project was to estimate national tariffs and the financial impact of care of patient with lung disease and varying the valuation according to the patient's condition.

Methods
As part of the analyzes, it is planned to use cost calculation based on financial and accounting data as well as clinical and cost data of individual hospitalizations. The next stage will be to differentiate the patient's condition based on the British system (and other systems). In the event of difficulties in obtaining information, it is planned to base the analysis on the reference course of the service prepared in cooperation with clinical experts to estimate the variable costs. During the Agency's work on the areas of services included in the pricing plan, an analysis will be made of the possibility of providing the above-mentioned services in an outpatient and inpatient mode, in order to optimize treatment and synchronize the valuation of outpatient and inpatient services. In addition, an analysis

of internal medicine groups will be performed in order to distinguish the most underestimated groups.

Results
The final result of the work will be a valuation based on the actual costs incurred by hospitals and the creation of a catalog of base groups in section D, taking into account the variables related to the patient's severity, e.g. comorbidities, which will allow for an analysis of the possible implementation of a payment depending on the resources used and correlated with the patient's condition.

Conclusions
Adjusting the valuation of tariffed benefits to the real costs incurred by service providers will allow to ensure a better standard of providing benefits by adjusting the amount of reimbursement. The introduction of a new method of settling benefits based on the patient's clinical condition should result in a more rational management of funds in the hospitals.

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Evaluation of health services costs in the field of ophthalmology in the polish health care system

Anna Maria Albrycht [a], Irena Rutkiewicz [a], Anna Pomianowska [a]

Introduction
Vision - is one of the four basic human senses. Loss of sight, but also visual impairment, has a profound impact on all aspects of human life, including professional work, development opportunities and self-realization. For this reason, the prevention of eye diseases, their early diagnosis and effective treatment should be one of the priorities of public health policy.

Currently, the Polish system includes 37 polish diagnosis-related groups (DRGs) dedicated to eye diseases. Only 1 group relates to the accounting of the nonsurgical diseases, remaining groups involve the performance of the diagnostic or surgical intervention.

Methods
It is assumed that the basis for the assessment will be a cost analysis based on data provided on the patient, as well as financial data on ward level.

In case of difficulties in obtaining data of the resources associated with service delivery, expert analysis is used. This allows for a correct assignment of the resources used.

Results
If a statistically significant data sample is available, evaluations are carried out (e.g. with regards to the following variables: length of hospital stay, age, diagnosis, procedure, service provider category, cost center specificity, i.e. pediatric surgery versus. general surgery), the results of which will help identify the need to introduce potential changes in the features of polish DRGs (JGP). It is also planned to conduct analyzes aimed at comparing the cost of unilateral procedures with the cost of bilateral procedures, as well as comparing the costs of identical procedures performed in the hospital, in outpatient conditions in hospital clinics or in outpatient clinics.

Conclusions
Adjusting the costs evaluation of chargeable services to the real costs of the service providers will allow to ensure a better standard of hospital payments by adjusting the level of reimbursements and financial aid for patients as well as facilitate access to the services concerned within the public system.

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Casemix Index in Saudi Arabia MOH Hospitals

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Introduction
In Saudi Arabia, 60% of the population receive their healthcare through the public hospitals, mainly ministry of health (MOH) hospitals. These hospitals are grouped into 21 clusters distributed throughout the country. As the level and complexity of care delivered varies across these hospitals, it raises a need for adopting a methodology that optimizes funding for these hospitals. CMI could potentially be used as one of the factors to adjust the payments for healthcare providers to account varying levels of care complexity. The CMI of a facility reflects the diversity and clinical complexity of the patients and the associated resources utilized in the care of those patients. Furthermore, it allows measurement of how well a hospital is carrying out clinical procedures that are common across all specialties. It is commonly used as an indicator of the cost of treating a particular patient. CMI is based on a classification system that uses AR-DRG as a unit of classification. It is also used for benchmarking activities to compare hospitals' performance using efficiency KPIs. The main objective of this study was to measure the CMI of Ministry of Health hospitals in Saudi Arabia.

Methods
This study was based on cross-sectional data of 67 MOH hospitals. CMI is calculated by dividing the sum of all episodes' DRG-relative weights by the total number of discharges during the same reporting period. Hospitals included in the analysis were categorized into 3 groups: general hospitals, specialized hospitals, and medical cities. Data for different variables including patients' demographics, episode details, DRG, MDC, DRG-weight, and procedures were collected.

Results
We found that CMI varies across hospitals depending on hospital size and type. The average CMI for all 67 hospitals was 1.26 (95% CI: 0.64 to 2.55). At cluster level[1] the highest CMI was observed in "Cluster19" with CMI of 1.67, while the lowest clusters were "Cluster14" & "Cluster17" with CMI 1.02. Amongst providers, medical cities had the highest average CMI of 1.47 compared to specialized hospitals and general hospitals at 1.32 and 1.21 respectively. High CMI for medical cities is consistent with the complexity and type of services utilized at these facilities, which may involve utilizing more resources especially advanced technologies. One medical city "MC1" with more than 92,000 encounters had an unexpectedly low CMI of 0.92, not representative of the expected case mix given the facility type. On the other hand, "MC2", and "MC3" had much higher CMI of 1.65 and 1.83 respectively. CMI also varied by the size of hospitals across clusters. Large hospitals had an average of CMI of 1.42, while small hospitals had an average of CMI of 0.97.

Conclusions

CMI varies across hospitals depending on the type and size of the facility. Several MOH hospital have low CMI values, which indicates the potential to improve productivity and eventually efficiency. These findings will have implications on policies related to hospitals operation and resources utilization.

References

1. Cluster numbers are arbitrarily assigned and do not correspond to actual cluster numbers.

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