Analysis of CaseMix data – Rapid diagnostics in gastrointestinal infections to avoid unnecessary costs for isolation

„We cannot direct the wind, but we can adjust the sails“
(Aristotle)

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Agenda

GI INFECTIONS – A CLINICAL AND ECONOMICAL CHALLENGE

HEALTH ECONOMIC MODEL

RESULTS

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Gastrointestinal Infections

Gastrointestinal infections (GI) are viral, bacterial or parasitic infections that cause gastroenteritis.

Dehydration is the main danger of gastrointestinal infections

Symptoms include **diarrhea**, **vomiting**, and **abdominal pain**.

Gastrointestinal Infections

6 to 60 billions episodes annually[1]

3-6 million children die each year from infectious gastroenteritis[2]

Transmitted via **unclean drinking water** or direct transmissions from **person to person[2]**

Can be **dangerous** in a particular medical setting or for certain patient populations

Sources:
[1]American Academy of Microbiology, 2002, DOI: 10.1128/AAMCol.15Feb.2002
[2]Merck Online Medical Library – Gastrointestinal Disorders www.merck.com

Economic Challenges

Preventive isolation (until Test result is available)

New faster lab tests (**based on Polymerase-chain-reaction – PCR**) are more expensive than the standard of care

Late Test results (often after 2 days and more) cause late correct therapy and lengthen LOS

The laboratory department is just aware of its own budget & costs

Hypothesis

- A faster availability of correct test results from a stool sample leads to savings
  - Avoid **unnecessary isolation** (= reducing Isolation days)
  - **Faster treatment** and **recovery** (= reducing LOS)
- The savings will **outnumber the additional costs** for the faster (PCR-based) laboratory test

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Steps to a Health Economic Model

<u>Step 1: Coding</u>

Translating the GI Infections into ICD 10 GM (Version 2022)

<u>Step 2: Epidemiology</u>

Identifying the prevalence in Germany

<u>Step 3: Patient Pathways</u>

Building two different pathways (Standard of Care vs. new Test)

<u>Step 4: Comparison</u>

Comparing the two pathways, regarding costs, LOS, isolation time, etc.

GI Infections in ICD 10 Coding[1,2]

Specific ICD 10 Coding

- Cholera* (A00.0*)
- Typhus abdominalis and paratyphoid fever (A01.*)
- Salmonella enteritis* (A02.0)
- Salmonella sepsis* (A02.1)
- Shigellosis* (A03.*)
- **E**ntero**p**athogenic **E**scherichia **c**oli (EPEC)* (A04.0)
- **E**ntero**t**oxigenic **E**scherichia **c**oli (ETEC)* (A04.1)
- **E**ntero**i**nvasive **E**scherichia **c**oli (EIEC)* (A04.2)
- **E**ntero**h**emorrhagic **E**scherichia **c**oli (EHEC)* (A04.3)
- Campylobacter* (A04.5)
- Yersinia enterocolitica (A04.6)
- Clostridium difficile* (A047*3)
- Food poisoning due to Vibrio parahaemolyticus (A05.3)
- Acute & Non-dysenteric amoebic dysentery (A06.0/2)
- Giardiasis [Lambliasis]* (A07.1)
- Cryptosporidiosis (A07.2)
- Enteritis due to rotaviruses* (A08.0)
- Acute gastroenteritis due to norovirus* (A08.1)
- Enteritis caused by adenoviruses* (A08.2)

Unspecific ICD 10 Coding

- Enteritis caused by other viruses (A08.3)
- Viral intestinal infection, unspecified (A08.4)
- Other specified intestinal infections (A08.4)
- Other and unspecified gastroenteritis and colitis of infectious and unspecified origin (A09.*)

Sources:
[1]Praktische Krankenhaushygiene und Umweltschutz. 2018 ; 207–224.; DOI:10.1007/978-3-642-40600-3_132
[2]Bundesinstitut für Arzneimittel und Medizinprodukte; ICD-10-GM Version 2022

*indication requires isolation

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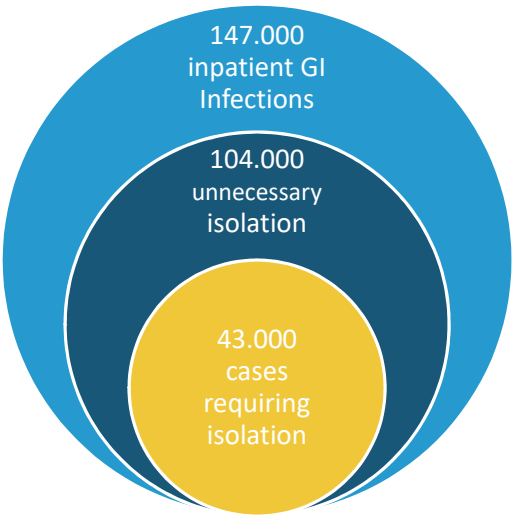
Epidemiology – Germany 2020[1]



- **71% of all cases had an infections where no isolation is necessary**

Sources:
[1]InEK Datenbrowser 2021

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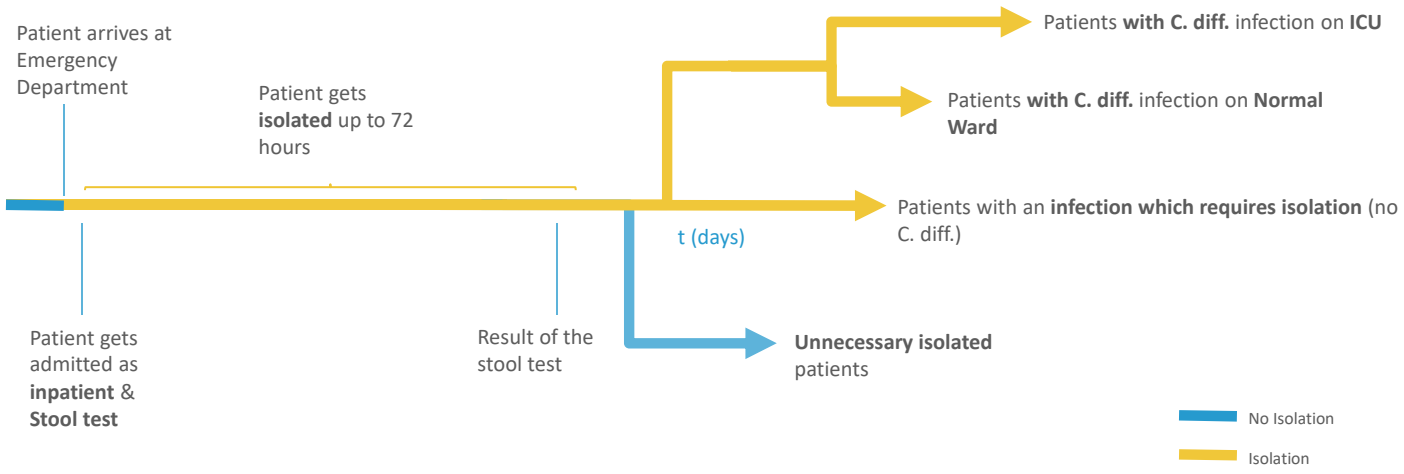
GI - Patient Pathway[1]



Sources:
[1]AWMF: S2k-Guideline Gastrointestinale Infektionen und Morbus Whipple, Registernummer 021 – 024

Cost Calcualtion via DRGs

	DRG G67C InEK Matrix 2019											
Cost type	1 Specialists (Physician)	2 Nurses	3 Assistants	4a Drugs	4b Drugs (expensive)	5 Implants	6a Disposables	6b Disposables (expensive)	6c Medical treatment services purchased from other parties (e.g. external laboratories)	7 med. infrastructure	8 non med. infrastructure	Sum
Cost center	1	2	3	4a	4b	5	6a	6b	6c	7	8	
01 Normal Ward	*227,28 €*	*- €*	*13,21 €*	*23,98 €*	*1,55 €*	*- €*	*24,34 €*	*0,57 €*	*2,92 €*	*108,67 €*	*312,81 €*	**715,33 €**
02 ICU	*5,74 €*	*- €*	*0,07 €*	*0,56 €*	*0,14 €*	*- €*	*1,01 €*	*- €*	*0,02 €*	*1,83 €*	*5,10 €*	**14,47 €**
03 Dialysis department	*- €*	*- €*	*- €*	*- €*	*- €*	*- €*	*- €*	*- €*	*- €*	*- €*	*- €*	**- €**
04 Surgery (Operation Room)	*1,06 €*	*- €*	*1,15 €*	*0,05 €*	*- €*	*0,01 €*	*0,39 €*	*0,09 €*	*0,06 €*	*0,58 €*	*0,66 €*	**4,05 €**
05 Anesthesia	*2,17 €*	*- €*	*1,26 €*	*0,12 €*	*- €*	*- €*	*0,36 €*	*- €*	*- €*	*0,28 €*	*0,62 €*	**4,81 €**
06 Delivery room	*0,01 €*	*- €*	*0,02 €*	*- €*	*- €*	*- €*	*- €*	*- €*	*- €*	*- €*	*0,01 €*	**0,04 €**
07 Cardiac cath lab	*0,13 €*	*- €*	*0,07 €*	*- €*	*- €*	*- €*	*0,02 €*	*0,01 €*	*- €*	*0,02 €*	*0,05 €*	**0,30 €**
08 Endoscopy	*51,90 €*	*- €*	*57,89 €*	*2,12 €*	*0,10 €*	*0,18 €*	*23,50 €*	*4,85 €*	*0,27 €*	*23,93 €*	*31,84 €*	**196,58 €**
09 Radiology	*13,03 €*	*- €*	*15,02 €*	*0,15 €*	*0,13 €*	*- €*	*2,04 €*	*0,47 €*	*14,98 €*	*5,18 €*	*8,53 €*	**59,53 €**
10 Laboratories	*6,45 €*	*- €*	*26,97 €*	*0,69 €*	*2,52 €*	*- €*	*18,93 €*	*0,04 €*	*42,45 €*	*3,28 €*	*11,51 €*	**112,84 €**
11 Other diagnostics	*19,46 €*	*0,49 €*	*12,78 €*	*0,26 €*	*0,01 €*	*- €*	*1,81 €*	*0,04 €*	*0,28 €*	*3,10 €*	*7,66 €*	**45,89 €**
12 Other therapeutics	*0,69 €*	*0,47 €*	*5,37 €*	*0,02 €*	*- €*	*- €*	*0,12 €*	*0,01 €*	*0,73 €*	*0,23 €*	*1,58 €*	**9,22 €**
13 Emergency Department	*42,54 €*	*5,02 €*	*32,39 €*	*1,52 €*	*0,03 €*	*- €*	*5,54 €*	*- €*	*0,19 €*	*7,53 €*	*26,37 €*	**121,13 €**
Sum	**370,46 €**	**5,98 €**	**166,20 €**	**29,47 €**	**4,48 €**	**0,19 €**	**78,06 €**	**6,08 €**	**61,90 €**	**154,63 €**	**406,74 €**	**1.284,19 €**

Compilation of case costs from DRG cost matrix

- Cost at Emergency Department (Analysis of all cases)
- Costs for Initial Isolation, Treatment and Laboratory (Analysis of all cases)
- Costs for Specific Treatment and Laboratory (Analysis of individual groups)
- Costs for Specific Endoscopy (Analysis of individual groups)

Economic Model – 2 Pathways

Today:

- Stool Test
- Preventive Isolation
- Delayed specific treatment
- Time to result in **48-72 hours**
- Price: **10 €**

Vs.

New:

- PCR Test
- Only Isolate patients who need it
- Immediate specific treatment
- Time to result in **1-4 hours**
- Shorter time to optimal therapy
- Reducing isolation time & isolation costs
- Reducing Length of stay
- Price: **100 €**

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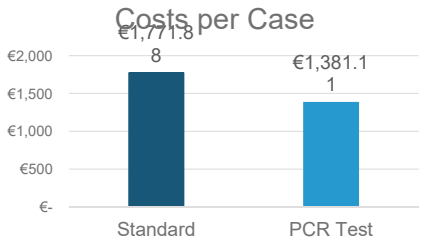
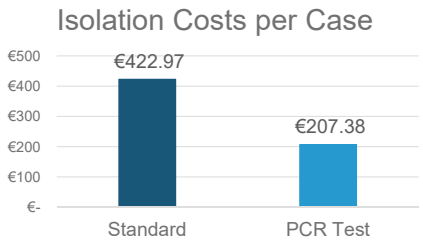
Results (1)

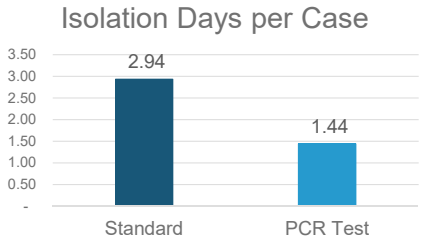


Costs per case decrease by **€ 390**

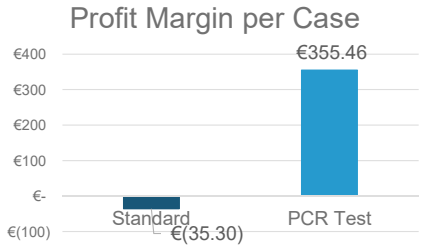


Isolation Costs per case decrease by **€ 215**

Results (2)



Isolation days decrease by **1,5 days**



Profit Margin is **€ 355** per case

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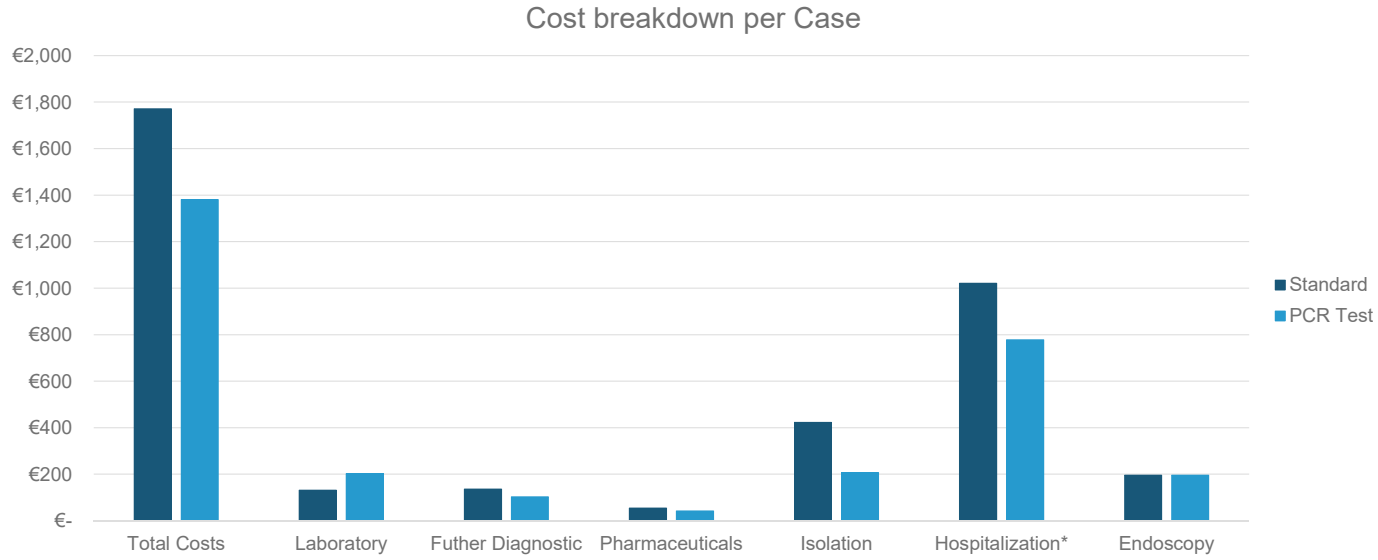
Result (3)



*includes costs for treatment in the normal ward, intensive care ward and patient admission including isolation

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Summary

- Gastrointestinal Infections are still **high risk in medical settings**
- Guidelines **require immediate isolation** until test result is available
- GI Infections occur in over **25 different DRGs**
- Rapid diagnostic is **key in avoiding unnecessary isolation time & costs**
- Lab costs are higher with PCR Testing, however **total costs per case decrease**
- Using a PCR Test **saves** in average up to **€ 390 per case**

Any Questions ? ☺

What else can we do for you?

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