



# BD Healthcare Resilience Barometer Belgium in focus

2024 edition





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**We can always do more to enhance access to care for all, in Belgium.**”

**Alexander Alonso**  
 General Manager Benelux, BD

## Foreword

Healthcare resilience is often discussed in terms of the ability to adapt to challenges. However, it is equally important to recognise resilience as the capacity to embrace opportunities. Our healthcare systems must not only be robust enough to withstand major crises but also flexible and innovative enough to integrate new advancements effectively.

In Belgium, our healthcare system shows significant potential for improvement in both these areas: the findings of the 2024 edition of the Healthcare Resilience Barometer from BD, reveal that Belgium lags behind several European countries. This underscores the urgent need to focus on preventing errors and infections as well as on implementing the right monitoring frameworks to ensure safer patient care.

Although most of the Belgian population has good access to healthcare, there is more to do to ensure their safety when

receiving care. Protecting the well-being of patients and staff is essential for maintaining high standards of care, and avoiding safety incidents helps to avoid unnecessary care. Closely linked to this is the necessity of enhancing system efficiency. We must create a sense of urgency around preventive measures, including patient safety, and integrate technological innovations to redistribute workloads. This will enable healthcare professionals to leverage their expertise more effectively while protecting their mental and physical health.

A crucial aspect of this transformation is reshaping the healthcare financing model in Belgium. It must be redesigned to incentivise qualitative outcomes, foster the adoption of innovations, and enhance overall efficiency.

As a leading MedTech company, BD understands the risks and challenges the healthcare system is facing and we are committed to supporting its sustainability. The foundation of this second edition of the Healthcare Resilience Barometer is our commitment, centred on identifying the areas where our innovative efforts can best support the development of a resilient healthcare system. This includes reinforcing patient safety, providing support to healthcare professionals, and enhancing operational efficiency.

Our vision is to illuminate the current state of healthcare resilience in Belgium and inspire actionable strategies to strengthen our healthcare system for the future. Together, we can create a resilient and sustainable healthcare system that meets the needs of every Belgian.



# Methodology

## Selection of resilience indicators

This iteration of the Healthcare Resilience Barometer explores the resilience of the Belgian healthcare system. From the perspective of three core pillars – the patients, the healthcare workforce, and the overall efficiency and sustainability of care delivery – this report measures Belgium’s performance across several indicators.

According to the World Health Organisation (WHO) a resilient healthcare system is one “that can effectively prevent, prepare for, detect, adapt to, respond to, and recover from public health threats while ensuring the maintenance of quality essential and routine health services in all contexts.”

This country-specific deep dive into Belgium’s healthcare system follows the BD 2024 EMEA Healthcare Resilience Barometer. The data analysed in the Belgium report is sourced from a wider dataset that was used for the regional report and provides a more detailed insight into the Belgian healthcare system, both as a standalone and in comparison to other BD countries of interest.

The 2024 EMEA Healthcare Resilience Barometer is formed of a total of 22 indicators, which are listed throughout this report. However, it is important to note that Belgium does not hold scores across the following indicators due to unavailable data – surgical site infections (SSI), occupational health and safety policy and preventable deaths.

In each section is Belgium’s ranking out of the 100 countries on each of the 22 indicators. An absent ranking indicates that some of the 100 countries do not have scores due to unavailable data. Therefore, to include Belgium’s ranking would compromise comparability and render it inaccurate. For this reason, Belgium’s positioning has not been included.

Figure 1: 2024 BD Healthcare Resilience Barometer – Core themes

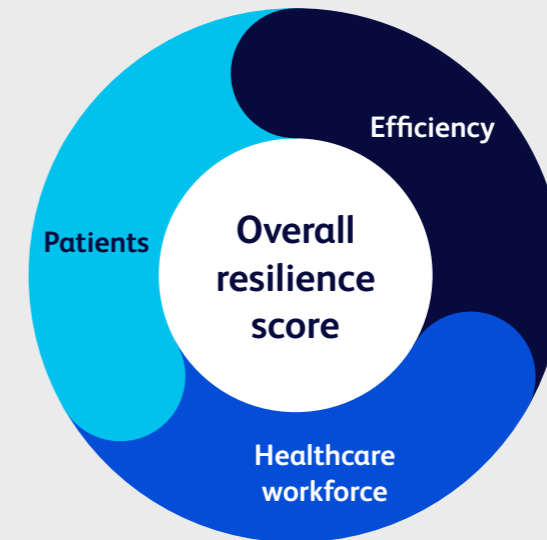


Table 1: 2024 BD Healthcare Resilience Barometer Indicators by Theme

Patients	Healthcare workforce	Efficiency
Universal health coverage	Nurses per 10,000 population	Inflation
Adverse effects of medical treatment	Doctors per 10,000 population	Health expenditure
Complications following therapeutic procedures	Ratio of nurses to doctors	Healthy life expectancy
Healthcare-associated infections (HAI)	Nurses aged 55 or above	Preventable deaths
Surgical site infections (SSI)	Healthcare staff burnout	Length of hospital stay
Sepsis	Occupational health and safety policy	Healthcare % of national footprint
AMR-related deaths		Healthcare CO2 emissions per capita
HAI surveillance		
HAI guidelines		

1 World Health Organisation (WHO). Health Systems Resilience. <https://www.who.int/teams/primary-health-care/health-systems-resilience>



# Key findings

The BD Healthcare Resilience Barometer was developed using a selection of primary literature and secondary datasets from internationally recognised sources including the World Health Organisation (WHO), the Organisation for Economic Cooperation and Development (OECD), the Institute for Health Metrics and Evaluation (IHME), the World Bank and the European Centre for Disease Prevention and Control (ECDC). Primary research was also conducted to complement the findings. This included a multi-market survey among healthcare professionals (HCPs) and a series of in-

depth interviews with key opinion leaders in the healthcare sector in Belgium.

Please note that the content of each interview reflects the perspective of the individual stakeholder on the topics discussed, and not necessarily the position of the organisation which the stakeholder represents, or of BD.

See the Appendix for detailed references, further information about the research and a full list of stakeholders consulted.

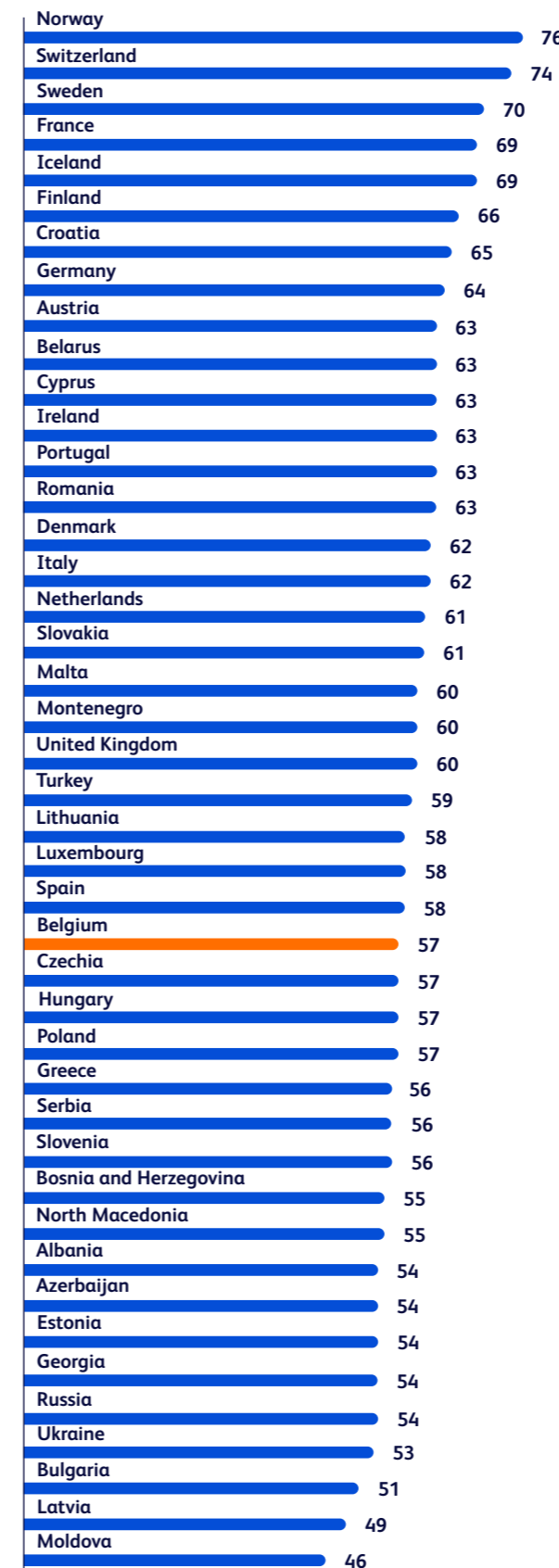
## Resilience scoring

The selected indicators for the BD Healthcare Resilience Barometer were grouped into one of our three thematic areas - the patients, the healthcare workforce and the efficiency of the system. With raw data points collected on different scales and measurements, all resilience indicators were standardised on a 0-100 scale to allow for comparison.

Within each of the three themes, indicator-specific scores were aggregated to produce a thematic score, and then to create the overall resilience score at a country level. Please note that a higher barometer score always corresponds to a stronger (positive) performance.

Further information about the data standardisation and scoring process can be found in the Appendix.

Figure 2: Overall barometer performance - select European countries\*



Belgium position in EMEA ranking:

# 35th / 100

countries

The 2024 Healthcare Resilience Barometer reveals that Belgium is outperformed by a number of European nations on key resilience indicators. Belgium’s overall performance is roughly on par with Spain and Czechia, but it lags significantly behind countries such as France, Germany, and the Nordics.

Examining the three core thematic areas of this year’s Healthcare Resilience Barometer, in comparison to the other EMEA countries explored, Belgium performs strongly on universal health coverage, healthcare expenditure and healthy life expectancy. It’s overall ranking is impacted elsewhere within the efficiency category, as the country performs poorly on environmental sustainability measures, namely, the carbon footprint of its healthcare system.

Overall, Belgium ranks 35th out of the 100 countries across Europe, the Middle East, and Africa (EMEA) included in the Healthcare Resilience Barometer.

Featuring the perspectives of key opinion leaders and subject matter experts, this report explores the strengths and weaknesses of the Belgian healthcare system in the areas of patient safety, the healthcare workforce, and efficiency.

# Chapter 1

## Patients

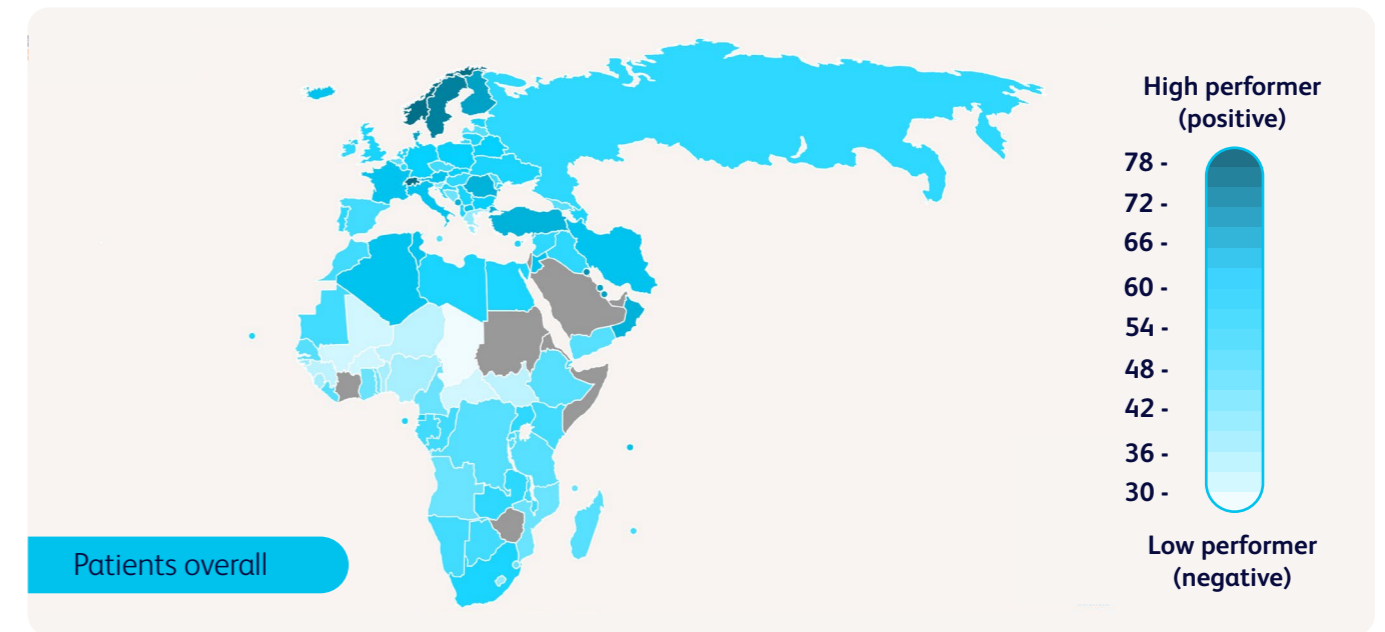
Although the concept of healthcare resilience can be understood and measured in different ways, some of the most important indicators of the robustness of a healthcare system are related to patients. The various strengths and weaknesses of care provision can be reflected in patient outcomes, patient safety, or patient experience. Building resilient healthcare, therefore, must be driven by the objective of creating systems that meet the needs of current and future patients in a safe and efficient way.

In this first chapter of the report, we explore healthcare resilience in Belgium through the lens of patients and patient safety. At BD, we believe that patient safety is critical to healthcare resilience. The vulnerabilities inherent in medical care mean that implementing innovation to minimise the risk of harm to patients must be a priority for all healthcare organisations. Raising awareness and training staff to identify and effectively mitigate risk of harm throughout the patient pathway is also essential in order to enable the sustainable delivery of safe, high-quality healthcare for current and future generations.<sup>2</sup>

Advances in medicine over recent decades have significantly improved patient safety around the world, but there remain ongoing and newly emerging threats.<sup>3</sup> The cost of unsafe care is considerable – both in terms of the health burden for patients affected, and in terms of the share of financial cost attributable to

patient safety incidents.<sup>4, 5</sup> In assessing the resilience of healthcare systems in EMEA countries from a patient perspective, the BD Healthcare Resilience Barometer focuses on key issues including access to care, antimicrobial resistance (AMR), HAIs and treatment complications. While these specific topics do not comprehensively reflect all the challenges around patient safety, it is useful to delve into some of the most acute patient safety issues that represent a larger disease burden.<sup>6</sup> In the 2024 edition of the BD Healthcare Resilience Barometer, Belgium’s healthcare system exhibits a blend of strengths and weaknesses when it comes to patient safety.

Figure 3: Map showing overall ‘patients’ barometer performance at an EMEA level



- 2 European Union Network for Patient Safety (EUNetPaS). Use of Patient Safety Culture Instruments and Recommendations; 2010. Page 4. [https://seguridad-del-paciente.sanidad.gob.es/proyectos/participacionInternacional/docs/WP1-REPORT\\_Use\\_of\\_PSCI\\_and\\_recommendations\\_-\\_March\\_2010.pdf](https://seguridad-del-paciente.sanidad.gob.es/proyectos/participacionInternacional/docs/WP1-REPORT_Use_of_PSCI_and_recommendations_-_March_2010.pdf)
- 3 Organisation for Economic Co-operation and Development. The economics of patient safety; 2020. <https://www.oecd.org/health/health-systems/Economics-of-Patient-Safety-October-2020.pdf>
- 4 Organisation for Economic Co-operation and Development. The economics of

- patient safety; 2020. <https://www.oecd.org/health/health-systems/Economics-of-Patient-Safety-October-2020.pdf>
- 5 Slawomirski, L, Auroaen, A, Klazinga, N. The economics of patient safety: Strengthening a Value-Based Approach to Reducing Patient Harm at National Level. <https://doi.org/10.1787/18152015>
- 6 World Health Organisation. Patient Safety: Global Action on Patient Safety: Report by the Director-General. Accessed August 3, 2022. <https://iris.who.int/handle/10665/327526>







## Healthcare for all – access and beyond

One of Belgium's standout strengths is its robust Universal Health Coverage (UHC) score, significantly above the EMEA average. With this high level of healthcare accessibility implemented through compulsory health insurance, Belgium ensures that the vast majority of its inhabitants can receive essential medical services, laying the foundation for a resilient system capable of responding to population health needs.

<sup>7</sup> European Union. State of Health in the EU. Belgium Country Health Profile: 2021. Page 8. [https://health.ec.europa.eu/system/files/2021-12/2021\\_chp\\_be\\_english.pdf](https://health.ec.europa.eu/system/files/2021-12/2021_chp_be_english.pdf)

## A call for improved surveillance and prevention measures

According to data obtained from The Lancet, in comparison to the other EMEA countries analysed in the Healthcare Resilience Barometer, Belgium performs well on indicators relating to sepsis. The country achieved a low incidence rate in comparison to the other nations and is also on par with several other countries, including France, Ireland and Spain. While this demonstrates the effectiveness of the basic safety measures that are in place in Belgium, this does not also extend to HAI prevention. A recent study revealed that 9.2% of patients in Belgian hospitals contract a healthcare-associated infection, above the EU average of 6.8%. Of these HAIs in Belgium, 14% were caused by a surgical site infection<sup>9</sup>.

The barometer reveals a poor performance from the country on surveillance of HAIs, which are essential for promptly identifying and addressing infection outbreaks. According to ECDC, approximately 3.5 million cases of HAI occur in the European Union (EU) and European Economic Area (EEA) annually and result in 90,000 deaths.<sup>10</sup> This highlights the extent of the risk posed by HAIs and emphasises the need for robust surveillance and monitoring measures.

Currently, instances of HAIs and antimicrobial resistance (AMR) in Belgium are monitored through a collaboration between the National Surveillance of Infections in Healthcare Settings (NSIH) and Sciensano's Healthcare-Associated Infections and Antibiotic Resistance Service. The collaborators have announced their intention to review and improve the surveillance system for HAIs and AMR, acknowledging the necessity of including long-term care facilities in these efforts.<sup>11</sup> Furthermore, to extend coverage to include the potential medical implications of HAIs, the country has outlined its intention to establish a national action plan for sepsis prevention.

The Belgian Sepsis National Action Plan (Be-SNAP), a collaborative effort between The Global Sepsis Alliance and Sepsibel, details key areas to combat sepsis. It includes raising awareness, highlighting early warning signs and treatment and advanced care planning and research.<sup>12</sup>

<sup>8</sup> The Lancet. Sepsis incidence by location for all ages, both sexes, and all underlying causes, 1990-2017. Page 52. [https://www.thelancet.com/cms/10.1016/S0140-6736\(19\)32989-7/attachment/65105799-6ced-49c1-8bb8-83fc1fec01ed/mmc1.pdf](https://www.thelancet.com/cms/10.1016/S0140-6736(19)32989-7/attachment/65105799-6ced-49c1-8bb8-83fc1fec01ed/mmc1.pdf)

<sup>9</sup> European Centre for Disease Prevention and Control. Point prevalence survey of healthcare-associated infections and antimicrobial use in European acute care hospitals, 2022-2023. 6 May 2024. <https://www.ecdc.europa.eu/en/publications-data/PPS-HAI-AMR-acute-care-europe-2022-2023>

<sup>10</sup> European Centre for Disease Prevention and Control. Healthcare-associated infections. <https://www.ecdc.europa.eu/en/healthcare-associated-infections>

<sup>11</sup> One World One Health. Belgian 'One Health' National Plan on the fight against antimicrobial resistance (AMR); 2020-2024. Page 27. [https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth\\_theme\\_file/en-amr\\_one\\_health\\_national\\_plan\\_final\\_0.pdf](https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/en-amr_one_health_national_plan_final_0.pdf)

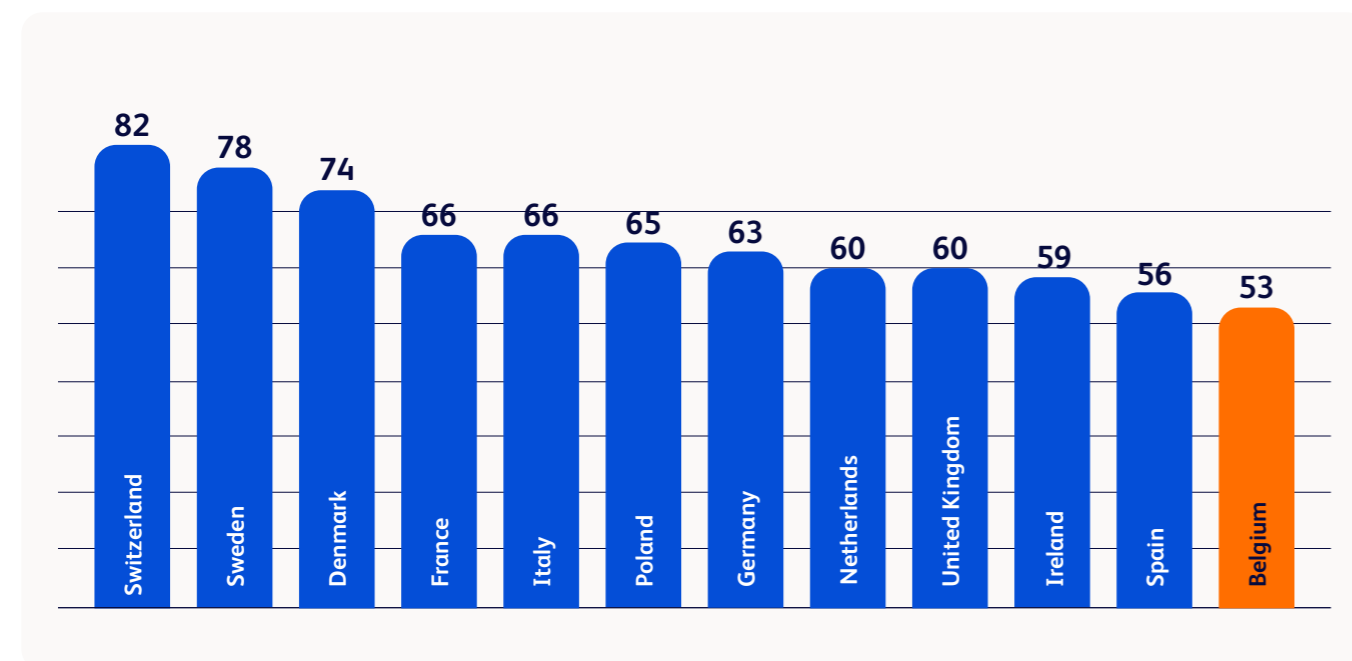
<sup>12</sup> Global Sepsis Alliance. GSA salutes first report on sepsis in Belgium, leading to a national plan. 3 June 2024. <https://globalsepsisalliance.org/news/2024/6/3/gsa-salutes-first-report-on-sepsis-in-belgium-leading-to-a-national-plan#:~:text=The%20submission%20of%20this%20report,of%20sepsis%20across%20the%20country.>

## Future focus – elevating patient safety in Belgium

To build a truly resilient healthcare system, Belgium must prioritise patient safety by addressing the persistent challenges of HAIs. Strengthening surveillance systems, implementing robust infection prevention and control measures, and promoting antimicrobial stewardship are critical steps in this endeavour. Currently, Belgium is outperformed by most major European

countries in the Healthcare Resilience Barometer in the patient safety category. However, by capitalising on its strengths in universal healthcare access and leveraging its commitment to medical research and innovation, Belgium has the potential to overcome the challenges around HAIs and emerge as a leader in patient safety.

Figure 4: Performance on 'patients' indicators - select European countries\*



**\*Disclaimer:** For the BD Healthcare Resilience Barometer report, our primary objective was to provide a comprehensive view of healthcare systems' resilience across Europe, the Middle East and Africa (EMEA). To ensure the relevance and applicability of our findings, we consulted with a wide range of key opinion leaders across the region. During our interviews, it became apparent that while a broad overview is essential, there is also a need to delve deeper into regional performance and explore how challenges in patient safety, healthcare workforce and efficiency continue to impact the resilience of more advanced healthcare systems in Europe. The inclusion of figures focused on a select group of countries serves to enrich the analysis and provide deeper insights into regional healthcare dynamics.



Figure 5: Belgium ranking out of 100 countries across Patient indicators

Indicator	Belgium positioning (out of 100 countries)
Patients (overall)	67th
Complications following therapeutic procedures	59th
AMR-related deaths	47th
Sepsis	23rd
Healthcare-associated infections (HAI)	-
Surgical site infections (SSI) **	-
HAI surveillance	-
HAI guidelines	-
Universal health coverage	11th

\*An absent ranking indicates that some of the 100 countries covered in the BD Healthcare Resilience Barometer do not have scores due to unavailable data. Therefore, to include Belgium's ranking would compromise comparability and render it inaccurate.

\*\* The indicator included in the wider EMEA report was drawn from a report that did not include Belgium within the scope of its study.

Figure 6: Belgium scores on individual Patient indicators and ranking in Europe, and EMEA average scores per indicator

Indicator	Belgium score	Rank in Europe (out of 43 countries)	EMEA average score
Patients (overall)	53/100	37th	57/100
Adverse effects of medical treatment	20/100	41st	63/100
Complications following therapeutic procedures	60/100	10th	61/100
AMR-related deaths	70/100	25th	68/100
Sepsis	80/100	28th	54/100
Healthcare-associated infections (HAI)	30/100	-	51/100
Surgical site infections (SSI)	-	-	73/100
HAI surveillance	20/100	-	40/100
HAI guidelines	50/100	-	50/100
Universal health coverage	90/100	8th	50/100

● Above EMEA average

● Below EMEA average



# Key opinion leader perspective



**Innovation from industry can ensure healthcare professionals are able to do their job in a more efficient way.** 

## Dr Eva Marie Castro

Head of Quality at RZ Heilig Hart Tienen and PhD at The Institute for Healthcare Policy (LIHP) KU Leuven, Belgium

*Dr Eva Marie Castro's experience within the healthcare sector has primarily revolved around patient care and is supported by her health policy-focused post-doctoral studies. In this conversation, she speaks about the need to amplify patient voices and discusses the role of industry innovation in enabling the healthcare workforce to operate more efficiently.*

## Patient-centred innovation

For Dr Castro, resilience in healthcare must be understood both at a system level and at the individual level. "Resilience is not just about how the system can adapt to crises, it's also about whether individual healthcare workers can adapt and whether patients are equipped with

the knowledge and support to navigate and overcome the crises they may be facing in their healthcare journey" - she explains. At a system level, Dr Castro emphasises the need for planning for the long-term sustainability of each healthcare organisation and recommends

The Flanders Quality Model (FlaQuM) to do so. At an individual level, she argues that patients must be actively engaged in the decisions made about the healthcare systems they rely on.

"We should focus more on co-creation with patients" - Dr Castro points out. "The voice of the patient, the patient's loved ones, and the patient associations still have less influence than necessary in the

## Industry's role in increasing workforce efficiency and wellbeing

Acknowledging the burden on healthcare staff, Dr Castro says that rigidity in the legal and financial functions within healthcare often lead to limited access to technological innovation. "The legal and financial frameworks are actually a hindrance to adopting innovations that could promote a more resilient system" - she states. Dr Castro believes that against the backdrop of extended waiting times and treatment delays, the streamlining of internal processes is more important than ever.

"Across countries, the pressures on the workforce are significantly impacting the availability of personnel and the overall quality of care" - she notes, emphasising that access to technological innovation is key in increasing operation efficiency and therefore should be a priority for healthcare management everywhere.


construction and evaluation of healthcare systems" - she adds. Dr Castro believes that all innovations aimed at building resilience should be developed in collaboration with patients. "Patients should be treated as equal partners in decision-making", she notes, stating that this approach is crucial in redesigning healthcare delivery and integrating innovation in a way that best serves the interests of patients.

"Innovation from industry can ensure healthcare professionals are able to do their job in a more efficient way and can truly benefit their wellbeing. When technology makes processes more efficient, healthcare professionals can focus on the reasons why they chose the profession in the first place" - she concludes.



# Key opinion leader perspective



**Collaboration, not only in hospitals, but beyond the walls of the hospital, it is going to be the new normal.** 

## Dr Ilke Montag

Chairman of Board of Directors at THE Institute and 'De Maakbare Mens' (Home - De Maakbare Mens) and Medical Policy Advisor at Socialist Mutual Funds, Belgium

*In our conversation, Dr Montag discusses the importance of the patient voice in the provision of quality care, as well as the need for a centralised digital system to reduce waste and facilitate smoother communication and distribution of information.*

## Healthcare resilience requires all the cogs to keep turning

Early on in our conversation, Dr Montag highlights several contributing factors to healthcare resilience – “flexibility and adaptability, emotional resilience, collaboration, self-care and continuous learning and improvement are the cogs in the wheel of ensured healthcare resilience.”

The current macro issues affecting the system include potential pandemics, climate change and environmental disasters. These issues can affect the flexibility of healthcare systems, with staff shortages and burnout contributing to further disruptions to healthcare delivery. Dr Montag states that addressing these

issues requires an integrated approach at all levels. It must be “aimed at strengthening health systems, improving access to affordable care and medicines, reducing inequities, and ensuring the quality and safety of care provided.”

The COVID-19 pandemic, while it brought about increased opportunities for technology and different ways of delivering care, had a significant impact on care in Belgium. Challenges arose that resulted in issues of hospital overload, postponement of non-essential care,

## Giving patients a choice in their care

On the topic of patients, Dr Montag stresses that better communication across teams should be a priority when improving the system in Belgium. “The different groups need to really start working together; now, too often, people work side-by-side and not with each other.” Throughout our conversation, Dr Montag emphasises the inclusion of the patients themselves in discussions about their care, calling it “necessary to patient empowerment and engagement.”

To facilitate this, she speaks of the importance of valuing the patient voice from as young an age as possible to maintain their confidence to speak up for themselves about their options and

impacted mental wellbeing and changes in healthcare protocols and procedures. Dr Montag declares that an important part of the resolution is “collaboration, not only in hospitals, but beyond the walls of the hospital, it is going to be the new normal.” Additionally, she calls for a move away from a fee-for-service financial model towards one that encompasses Pay for Performance (P4P)/Pay for Quality (P4Q), welcoming moves towards a value-based model.


the care they wish to receive. When presented with decisions to make regarding their care, Dr Montag explains that this is often a time for reflection for patients. Patients should be given the choice about the route they want to take and how it will shape their future.





# Key opinion leader perspective



**All avoidable deaths are linked to some type of patient safety issue.** 

## Denis Herbaux

CEO at PAQs and Deputy CEO at santhea, Belgium

*Denis Herbaux holds around a decade of experience and expertise in facilitating patient care and supporting public health in Belgium’s healthcare sector. In this conversation, Herbaux speaks on the issues affecting patient safety and the importance of education in improving quality of care.*

## Bureaucracy and resilience

With a decade of experience in optimising healthcare and patient safety, Denis Herbaux’s vision for better resilience in Belgium is built on the streamlining and simplification of bureaucratic processes. He believes that the complexity embedded within Belgian healthcare limits the system’s ability to react to change.

“Competencies are split between the federal and regional level. Hospitals are typically mostly financed by the federal level, but their norms, standards and the healthcare training for staff are mostly established at the so-called regional level.”

This multilayered governance model, Denis

argues, can pose a significant challenge to healthcare resilience. However, he points out that the learnings from the pandemic have been instrumental in encouraging a shift towards a more agile approach. “The

healthcare system felt like a war zone – but the gravity of the situation meant that we were forced to learn how to act, make decisions, and adapt quickly.”

## The role of education in patient safety

Turning to patient safety, Herbaux is quick to emphasise the gravity of the issue. “All avoidable deaths are linked to some type of patient safety issue” – he claims. Denis feels that patient safety is currently not at the top of the agenda. “Belgium is not talking enough about patient safety and the budget allocated to the issue is also very limited.”

While Denis believes that healthcare decision-makers hold a significant responsibility to take action, he thinks that true resilience requires a reform of healthcare education as well. “What is taught in medical and nursing schools should be revised to make future healthcare professionals aware that

they will be working in a very complex environment, and that this kind of environment can lead to safety issues” – he states. Those who want to work within the patient care sector need to be prepared to handle complex scenarios as a team while also having the ability to make individual decisions.”



# Chapter 2 Healthcare workforce

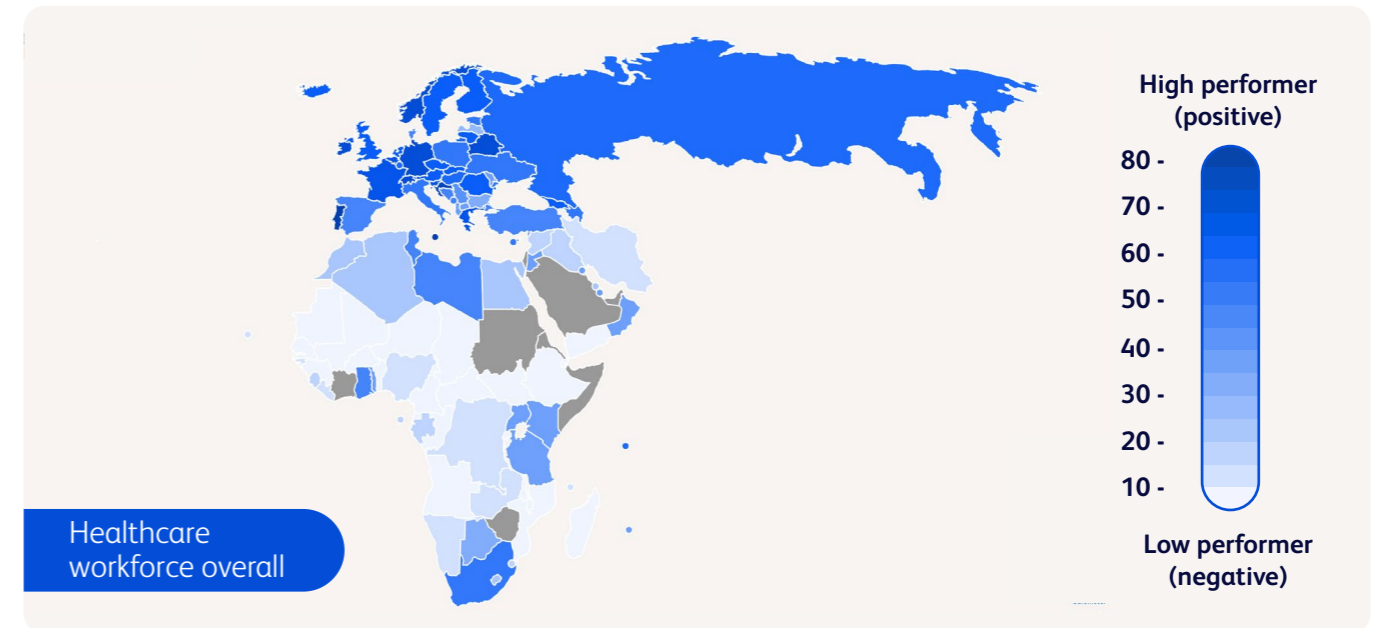
To get a more complete picture of the resilience of healthcare in Belgium, we next look at the indicators related to those who provide the care. The healthcare workforce is the most important component in the provision and delivery of care and is critical to healthcare resilience. A robust and well-supported workforce ensures that healthcare systems can adapt to crisis situations, integrate innovations and maintain high standards of care.

Although the discourse surrounding healthcare resilience today tends to centre around the intricacies of systems and structures, it is essential not to overlook the fundamental fact that care is ultimately delivered by individuals. Behind every medical breakthrough, every successful treatment, and every comforting word, there are healthcare professionals who have dedicated their lives to taking care of others.

Recent years have shone a glaring spotlight on the challenges faced daily by healthcare workers, whether related to working conditions, underfunding, lack of planning or other obstacles that hinder efficient and safe care delivery.<sup>13</sup> Just as patient safety is integral to healthcare resilience, so too is the wellbeing and safety of the healthcare workforce. Efforts aimed at strengthening the resilience of healthcare systems must prioritise alleviating the burden on staff and ensuring they have the support and resources necessary to deliver safe, high-quality care.

In this chapter, we examine the state of the healthcare workforce in Belgium, looking at issues ranging from ageing workforces, staff burnout and occupational health and safety.

Figure 7: Map showing overall 'healthcare workforce' Barometer scores at EMEA level



## Tackling the nurses per 10,000 population imbalance

While Belgium performs well in comparison to the recognised international standards on the indicator of nurses per 10,000 population, there remains considerable room for improvement in the country for an appropriate number of doctors and nurses for the current level of patient demand.

Although the number of practising nurses in Belgium increased from 2010 to 2018,<sup>14</sup> there is a significant imbalance in the number of patients per nurse in nursing homes and hospitals in the country. In 2019, the patient-to-nurse ratio in hospitals was 9.4 which, despite being an improvement from 2010, was much higher than what is internationally recognised as a safe patient-to-nurse ratio.<sup>15</sup> This observation is echoed by the Partnership

for Health System Sustainability and Resilience (PHSSR) report which stresses the significant difference in the potentially available nursing workforce and bedside staffing levels in acute hospitals<sup>16</sup>

In an effort to address this, the Belgian policy reform to improve nurse staffing levels was introduced in 2019 and rolled out post-pandemic. Although this saw an increase in budgeting for the nursing workforce, it did not prioritise measures that mandated and monitored nurse-to-patient ratios.<sup>17</sup> To ensure the safety and well-being of patients and nurses, better attention is required to ensure an adequate balance of healthcare professionals to sufficiently provide care.

<sup>13</sup> Organisation for Economic Co-operation and Development. The economics of patient safety; 2020 <https://www.oecd.org/health/health-systems/Economics-of-Patient-Safety-October-2020.pdf>

<sup>14</sup> Belgian Health Care Knowledge Centre (KCE). Performance of the Belgian health system: Report 2024. Supplement: Technical sheets for indicators – dimensions. Page 346. <https://kce.fgov.be/en/performance-of-the-belgian-health-system-report-2024>

<sup>15</sup> Belgian Health Care Knowledge Centre (KCE). Performance of the Belgian health system: Report 2024. Supplement: Technical sheets for indicators – dimensions.

Page 126. <https://kce.fgov.be/en/performance-of-the-belgian-health-system-report-2024>

<sup>16</sup> Partnership for Health System Sustainability and Resilience. Sustainability and Resilience in the Belgian Health System, February 2023. Page 47. [https://www3.weforum.org/docs/WEF\\_PHSSR\\_Belgium\\_2023.pdf](https://www3.weforum.org/docs/WEF_PHSSR_Belgium_2023.pdf)

<sup>17</sup> Van den Heede K, Balcaen K, Bouckaert N, et al. Improving hospital nurse staffing during the pandemic: Implementation of the 2019 Fund for Health Care Staff in Belgium. Health Policy. 2023;128:69-74. doi:10.1016/j.healthpol.2022.11.013



Furthermore, The ECAMET Alliance has called for European Institutions to prioritise the role of digitalisation and automation, specifically in cancer treatment.<sup>18</sup> Swift implementation of technological solutions such as electronic prescriptions with systems to support clinical decisions

## The challenge of staff burnout

In the Healthcare Resilience Barometer, Belgium performs poorly on the indicator of staff burnout. The country presents a low score for the mental well-being of the healthcare workforce, a trend which is observed across the EMEA region. A study covering four European countries (Belgium, Netherlands, Italy, and Poland) explored the retention of healthcare workers and identified some common themes. The results revealed that while nurses and physicians are highly engaged in their work with patients, they are “drained by paperwork, an unhealthy work-life balance, a lack of teamwork, limited development opportunities, and no appreciation from supervisors.”<sup>19</sup>

(CPOES), automated dispensing systems (ADS), electronic systems to control preparation (ESCPS), barcode medication administration (BCMA) and smart pumps have reportedly been proven to effectively reduce medication errors, alleviate staff shortages and reduce harm to patients.

This indicates that further attention is needed for staff well-being. The data shows a clear need for better accountability for the mental and physical health of the workforce. Ensuring the longevity of both the workforce and the wider healthcare system requires addressing these issues. Burnout not only affects the health professionals themselves but also impacts the quality of care they can provide, leading to a potential decline in patient safety and overall healthcare system efficiency.<sup>20</sup>

## Moving forward - enhancing workforce well-being

Looking forward, adequate nurse workforce provision in Belgium requires ongoing attention. Ensuring a safe number of patients per nurse should be made a priority to ensure the safety of both groups. Significant improvements are also needed to address staff burnout and further ensure the well-being of healthcare professionals. To further strengthen the resilience of its healthcare system, Belgium must implement measures to reduce administrative burdens, promote a healthy work-life balance, enhance teamwork, provide opportunities for professional development, and ensure that healthcare workers feel appreciated and supported. Optimising opportunities for automation and technology can help ease the workload and allow healthcare workers to fully engage in their duty of care. Introducing mental health support programmes and stress management training can also play a crucial role in mitigating burnout. This can ensure healthcare workers are in the correct headspace to treat and care for patients, as over 50% of harm to patients is preventable.<sup>21</sup> By tackling these challenges head-on, Belgium can enhance the resilience of its healthcare system, ensuring that it remains robust and capable of delivering high-quality care even in the face of future challenges.

<sup>18</sup> European Collaborative Action on Medication Errors and Traceability (ECAMET). Staff Shortages and Burn Out in Cancer Medication Administration in Europe. March 2024. Page 8. <https://ehma.org/app/uploads/2024/06/Staff-Shortages-and-Burn-Out-in-Cancer-Medication-Administration-in-Europe-WP.pdf>

<sup>19</sup> Godderis L. Mental Health: a focus on retention of healthcare workers. Eur J Public

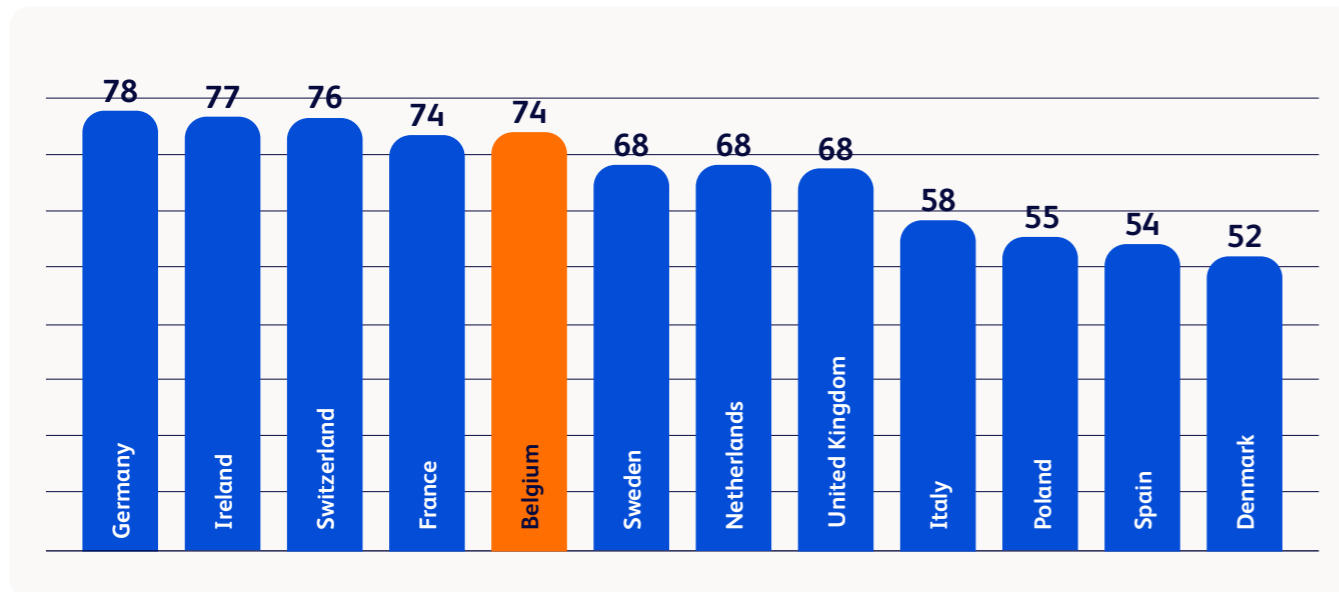
Health. 2023;33(Suppl 2):ckad160.619. Published 2023 Oct 24. doi:10.1093/eurpub/ckad160.619

<sup>20</sup> De Hert S. Burnout in Healthcare Workers: Prevalence, Impact and Preventative Strategies. Local Reg Anesth. 2020;13:171-183. Published 2020 Oct 28. doi:10.2147/LRAS240564

<sup>21</sup> World Health Organisation. Patient safety. <https://www.who.int/news-room/factsheets/detail/patient-safety>



**Figure 8:** Performance on 'healthcare workforce' indicators - select European countries\*



**\*Disclaimer:** For the BD Healthcare Resilience Barometer report, our primary objective was to provide a comprehensive view of healthcare systems' resilience across Europe, the Middle East and Africa (EMEA). To ensure the relevance and applicability of our findings, we consulted with a wide range of key opinion leaders across the region. During our interviews, it became apparent that while a broad overview is essential, there is also a need to delve deeper into regional performance and explore how challenges in patient safety, healthcare workforce and efficiency continue to impact the resilience of more advanced healthcare systems in Europe. The inclusion of figures focused on a select group of countries serves to enrich the analysis and provide deeper insights into regional healthcare dynamics.

**Figure 9:** Belgium ranking out of 100 countries across Healthcare Workforce indicators

Indicator	Belgium positioning (out of 100 countries)
Healthcare workforce (overall)	10th
Nurses per 10,000 population	2nd
Doctors per 10,000 population	3rd
Ratio of nurses to doctors	-
Nurses aged 55+	-
Staff burnout	-
Occupational health and safety	-

\*An absent ranking indicates that some of the 100 countries covered in the BD Healthcare Resilience Barometer do not have scores due to unavailable data. Therefore, to include Belgium's ranking would compromise comparability and render it inaccurate.

**Figure 10:** Belgium scores on individual Healthcare Workforce indicators and ranking in Europe, and EMEA average scores per indicator

Indicator	Belgium score	Rank in Europe (out of 43 countries)	EMEA average score
Healthcare workforce (overall)	74/100	10th	39/100
Nurses per 10,000 population	100/100	3rd	47/100
Doctors per 10,000 population	80/100	3rd	32/100
Ratio of nurses to doctors	80/100	-	61/100
Nurses aged 55+	70/100	-	59/100
Staff burnout	40/100	-	56/100
Occupational health and safety	-	-	55/100


● Above EMEA average      ● Below EMEA average





# Key opinion leader perspective



**It is the sum of a series of small and large actions which can create an intangible culture of appreciation in a hospital.** 

## Marc Noppen

CEO at University Hospital UZ Brussels, Belgium

*With around two decades of experience as the CEO of a university hospital and a background in clinical and interventional pulmonology, Marc Noppen shares his vision for building resilience in the healthcare system. He discusses evolving approaches to building a healthy workforce culture and how MedTech can support the patient-provider relationship.*

## Workforce: overwhelmed and under-appreciated

For Noppen, the greatest challenge to healthcare resilience lies in the state of the workforce. Discussing the post-pandemic capacity issues in healthcare systems globally, he says that most efforts to build resilience fail due to “a schism between the acute need for a robust workforce and the number of skilled professionals who are

available – and willing – to work under the current circumstances.” He observes that an aging population coinciding with the restricted inflow of new doctors as well as the age-outflow and task multiplication of nursing staff is resulting in a higher percentage of the workforce feeling overwhelmed, taking sick leave or leaving

their jobs. “The shortage of personnel leads to increased waiting lists, ward closures, and increased pressure on the remaining workforce, which becomes a vicious cycle” - Noppen explains.

Building a robust workforce, however, does not simply mean retaining a sufficient number of staff. Noppen emphasises that the sustainability and resilience of any healthcare organisation depend on the leadership’s ability to prioritise and improve the wellbeing of the workforce and the culture of operations. “We have to lead by example and show appreciation

## Health for sustainability

Noting that Belgium’s healthcare system remains volume-driven, with fee-for-service as the main mechanism for reimbursement and financing, Noppen emphasises that a switch in focus is required, and the primary objective of healthcare should be to support people in retaining good health and preventing illness. “As it stands, the Belgian system benefits financially from its hospitals being at capacity. This is not sustainable in the long-term, and we need to reframe how we think about the purpose of healthcare” - he says.

Noppen is enthusiastic about the introduction of AI and generative AI to healthcare. “I truly think it will be a game-

changer in how we relate to people” - he says. “It is the sum of a series of small and large actions which can create an intangible culture of appreciation in a hospital that can help build a sustainable, resilient healthcare system” - Noppen adds. Noppen further observes that people who work in healthcare are largely motivated by intrinsic factors that are built on a foundation of autonomy, mastery and purpose – and a resilient culture must therefore reflect these qualities.

changer in easing the workload for doctors and nurses.” He adds that examples of generative technology, such as genAI-supported speech-to-text systems, can play a key role in the automation of various workflows. “That it can record patient consultations removes much of the process for doctors and, allows them much more time to interact with their patients.”



# Chapter 3 Efficiency

## Building healthcare resilience – why processes matter

Resilient healthcare can only be achieved if all parts of the system are working optimally and with the same mission. In the previous chapters, the spotlight was rightly cast on the two primary actors in the healthcare system – the patients and the healthcare workers. However, there is an important and often overlooked component yet to be addressed.

This chapter is dedicated to exploring the processes that shape the efficiency of healthcare delivery in Belgium, and across the EMEA region. As OECD data shows that “a significant share of health spending (...) is, at best ineffective, and, at worst, wasteful”,<sup>22</sup> in this section we take a closer look at this topic, mapping out where the systemic inefficiencies occur.

Rising inflation is affecting health spending across EMEA,<sup>23</sup> with the demand for care leading already high operational costs to soar. The limitations to spending, as a result, are having a knock-on effect on healthcare systems’ resilience.

These limitations directly impact issues of healthcare workers’ pay, the daily

operating costs and the financial prospect of introducing new technologies and efforts towards improving sustainability.

An overview by the European Commission explains that national health systems throughout Europe are trying to secure equal access to essential, high-quality care while protecting their long term sustainability. And, with that, governments are intent on identifying ways in which they can improve their healthcare system’s efficiency while addressing this dual challenge.<sup>24</sup>

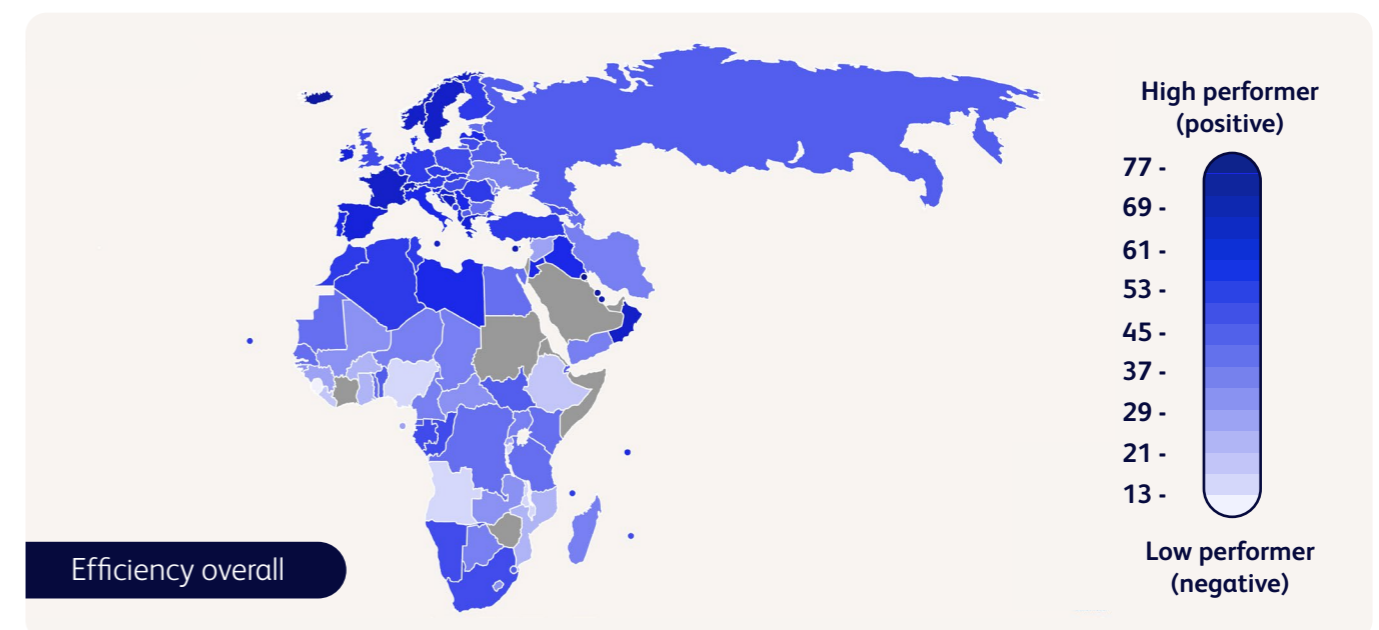
The indicators underpinning the scores in this section of the BD Healthcare Resilience Barometer were selected carefully to provide a detailed picture of efficiency.

Foremost among these is healthy life expectancy (HALE), but we also look at more specific metrics like the average length of hospital stay, which reflects the efficacy of treatments and the overall quality of care. Preventable deaths are also a key indicator of how well the healthcare system is fulfilling its intended purpose.

Of the three thematic areas of the 2024 Healthcare Resilience Barometer, it is in the efficiency category where Belgium achieves the lowest score, just above the EMEA

average. While the country scores highly on government healthcare expenditure and healthy life expectancy, the system grapples with efficiency challenges around the large environmental footprint and waste generated by the sector, which are issues facing most healthcare systems in the more affluent parts of the world.

Figure 11: Map showing overall ‘efficiency’ Barometer performance at an EMEA level



<sup>22</sup> Slawomirski, L, Auraan, A, Klazinga, N. The economics of patient safety: Strengthening a Value-Based Approach to Reducing Patient Harm at National Level. <https://doi.org/10.1787/18152015>

<sup>23</sup> World Bank. Inflation, consumer prices (annual %). <https://data.worldbank.org/>

indicator/FP.CPI.TOTL.ZG?view=map

<sup>24</sup> Kopp, B, Erstad, B, Allen, M, Theodorou, A, Priestley, G. Medication errors and adverse drug events in an intensive care unit: direct observation approach for detection. PubMed. <https://doi.org/10.1097/01.ccm.0000198106.54306.d7>



## Living healthier for longer

Belgium's score on government healthcare expenditure is almost double the EMEA average score. The country's substantial investment in healthcare has contributed to the development of a comprehensive healthcare infrastructure and services accessible to citizens. With an average life expectancy of 82 years, the country ranks among the highest globally.<sup>25</sup> The Healthcare Resilience Barometer shows Belgium to perform strongly on healthy life expectancy (HALE) as well, indicating that its population is living healthier for longer.

In addition to fiscal sustainability, the country's investment in research and development has led to it placing 9th in healthcare innovation in 2022.<sup>26</sup> The PHSSR report highlights Belgium's long-term investment in the digitalisation of the health system and the creation of

the Belgian Integrated Health Record as notable advancements in the country's technological innovation efforts.<sup>27</sup>

While the healthcare system has detailed its innovative plans to progress the system and build sustainable resilience, implementation to date has been slow. This is due to a complex structure that is also affected by "a lack of leadership and finances, an abundance of pilot projects, very long implementation and change processes and a system that is driven by providers and different cultures of action."<sup>28</sup> Therefore, improving the speed of implementation for technological innovation requires harmonisation, continued investment and improvements to pricing and reimbursement processes.<sup>29</sup>

## Efficiency challenges and environmental considerations

Belgium's poor overall performance in the efficiency category shows that its healthcare system is not without its challenges. One area of concern is the length of hospital stays, which remains higher than the European average. Prolonged hospitalisations not only increase costs but

also contribute to the healthcare system's environmental footprint, which, the 2024 Healthcare Resilience Barometer reveals, is a key challenge facing the Belgian healthcare system. The country performs poorly both on healthcare % of national footprint, and healthcare CO2 footprint per capita.

The healthcare sector's environmental impact is a growing concern globally. While precise data on medical waste generation is scarce, estimates suggest that healthcare facilities in developed countries produce up to 5.9 million tons of waste annually.<sup>30</sup> This waste includes hazardous materials, plastics, and other non-biodegradable items, posing challenges for proper disposal and treatment. To address these inefficiencies, Belgium has implemented strategies to promote more sustainable practices. For instance, the country has made strides in adopting biosimilar treatments, with a 12.6% uptake rate in 2021, reducing the environmental burden associated with manufacturing and transportation.<sup>31</sup>

<sup>30</sup> World Health Organisation (2022), Health-care waste. <https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/health-care-waste>

<sup>31</sup> Healthy Belgium. Efficiency of healthcare. <https://www.healthybelgium.be/en/health-system-performance-assessment/efficiency-of-healthcare>

<sup>25</sup> World Population Review (2024), Life Expectancy by Country 2024. <https://worldpopulationreview.com/countries/belgium-population>

<sup>26</sup> World Index of Healthcare Innovation (2022), Country Rankings. <https://freopp.org/belgium-9-in-the-2022-world-index-of-healthcare-innovation-feefc7986b22#:~:text=Belgium%20ranks%209th%20overall%20in,per%20capita%20among%20Index%20countries>

<sup>27</sup> Partnership for Health System Sustainability and Resilience (PHSSR). Sustainability and Resilience in the Belgian Health System. February 2023. Page 8. [https://www3.weforum.org/docs/WEF\\_PHSSR\\_Belgium\\_2023.pdf](https://www3.weforum.org/docs/WEF_PHSSR_Belgium_2023.pdf)

[weforum.org/docs/WEF\\_PHSSR\\_Belgium\\_2023.pdf](https://www3.weforum.org/docs/WEF_PHSSR_Belgium_2023.pdf)

<sup>28</sup> De Lepeleire J. Integration of Healthcare in Belgium: Insufficient, but There Is Hope Comment on "Integration or Fragmentation of Health Care? Examining Policies and Politics in a Belgian Case Study". *Int J Health Policy Manag.* 2023;12:7179. doi:10.34172/ijhpm.2022.7179

<sup>29</sup> Partnership for Health System Sustainability and Resilience. Sustainability and Resilience in the Belgian Health System. February 2023. Page 59. [https://www3.weforum.org/docs/WEF\\_PHSSR\\_Belgium\\_2023.pdf](https://www3.weforum.org/docs/WEF_PHSSR_Belgium_2023.pdf)

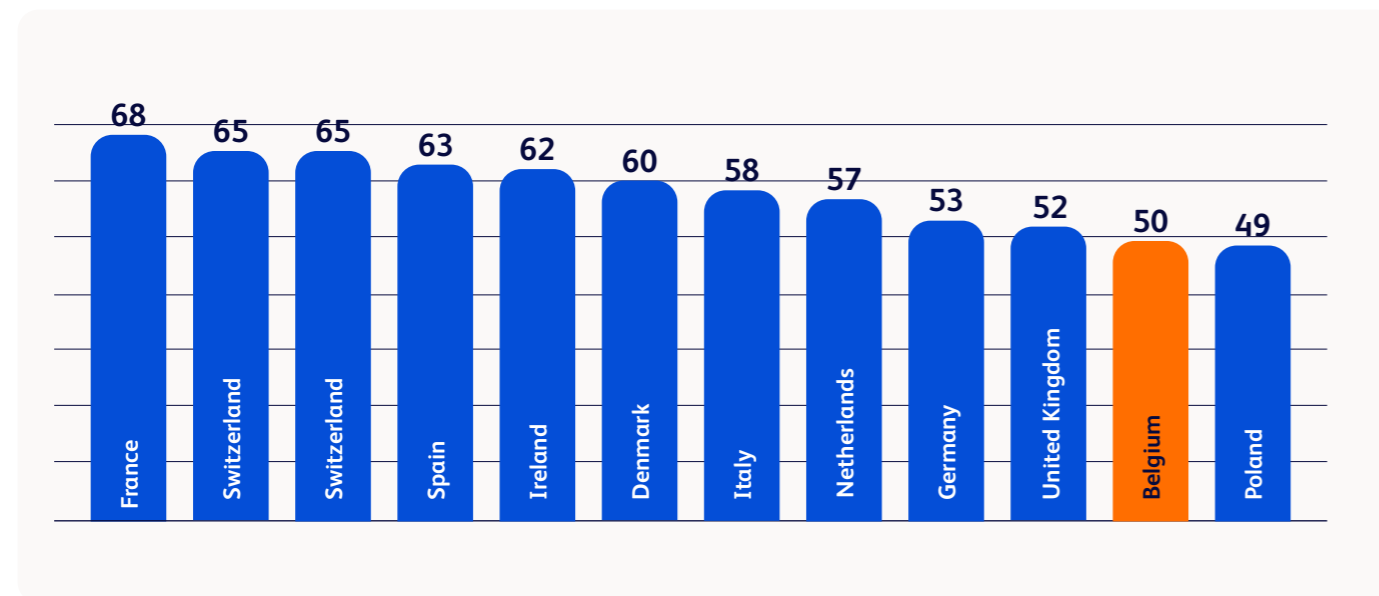


## Towards sustainable healthcare

Belgium's performance in the area of efficiency shows there is room for improvement to align with the PHSSR recommendation to optimise resource utilisation in order to reduce energy consumption and, ultimately, the system's environmental impact.<sup>32</sup> Addressing the length of hospital stays and promoting sustainable practices within healthcare facilities should be priorities. Moreover,

Belgium should continue to leverage its strengths in medical research and innovation to develop more cost-effective treatments and technologies. Ultimately, a holistic approach that balances fiscal responsibility, quality of care, and environmental stewardship, including the reduction of waste resulting from patient safety incidents, is crucial for enhancing the efficiency of Belgium's healthcare system.

Figure 12: Performance on 'efficiency' indicators – select European countries



**\*Disclaimer:** For the Healthcare Resilience Barometer report, our primary objective was to provide a comprehensive view of healthcare systems' resilience across Europe, the Middle East and Africa (EMEA). To ensure the relevance and applicability of our findings, we consulted with a wide range of key opinion leaders across the region. During our interviews, it became apparent that while a broad overview is essential, there is also a need to delve deeper into regional performance and explore how challenges in patient safety, healthcare workforce and efficiency continue to impact the resilience of more advanced healthcare systems in Europe. The inclusion of figures focused on a select group of countries serves to enrich the analysis and provide deeper insights into regional healthcare dynamics.

<sup>32</sup> Partnership for Health System Sustainability and Resilience. Building Sustainable and Resilient Health Systems. May 2023. Page 79. [https://www3.weforum.org/docs/WEF\\_PHSSR\\_Building\\_Sustainable\\_and\\_Resilient\\_Health\\_Systems\\_2023.pdf](https://www3.weforum.org/docs/WEF_PHSSR_Building_Sustainable_and_Resilient_Health_Systems_2023.pdf)

Figure 13: Belgium ranking out of 100 countries across Efficiency indicators

Indicator	Belgium positioning (out of 100 countries)
Efficiency (overall)	45th
Inflation	44th
Length of hospital stay	-
Health expenditure	12th
Healthy life expectancy	17th
Preventable deaths	-
Healthcare % of national footprint	-
Healthcare CO2 footprint per capita	-

\*An absent ranking indicates that some of the 100 countries covered in the BD Healthcare Resilience Barometer do not have scores due to unavailable data. Therefore, to include Belgium's ranking would compromise comparability and render it inaccurate.

Figure 14: Belgium scores on individual Efficiency indicators, ranking in Europe, and EMEA average scores per indicator

Indicator	Belgium score	Rank in Europe (out of 43 countries)	EMEA average score
Efficiency (overall)	50/100	32nd	48/100
Inflation	60/100	22nd	55/100
Length of hospital stay	40/100	-	38/100
Health expenditure	80/100	12th	42/100
Healthy life expectancy	80/100	20th	58/100
Preventable deaths	-	-	51/100
Healthcare % of national footprint	30/100	-	43/100
Healthcare CO2 footprint per capita	10/100	-	54/100


● Above EMEA average ● Below EMEA average

An absent ranking indicates that some of the 100 countries covered in the BD Healthcare Resilience Barometer do not have scores due to unavailable data. Therefore, to include Belgium's ranking would compromise comparability and render it inaccurate.



# Key opinion leader perspective



**You need to connect with the patient to effectively integrate the care around them, and, in this sense, technology will help towards value-based care.** 

## Professor Pascal Verdonck, Belgium

Professor of Biomedical Engineering and Medical Technology at Ghent University, Chairman of the Board at Artvelde University of Applied Sciences and Chairman at National Committee of Biomedical Engineering, Netherlands

*Through his background in biomedical engineering and decades spent working across the healthcare system, in this conversation Professor Pascal Verdonck offers his perspective on the current impact and potential of MedTech in facilitating healthcare efficiency and resilience in Belgium.*

## Opportunities for MedTech

Professor Verdonck credits the utilisation of technology as an integral initial step towards changing the healthcare system. Particularly when addressing the issue of waste, he says that technology can help ensure patients receive the correct treatment and care at the appropriate

time. Speaking of the inspiration he has found from the healthcare systems of other EU countries, Professor Verdonck names Portugal as a system that he is impressed with due to its increased investment in IT, less fragmentation in the health continuum and fewer silos which facilitate waste

reduction – “It’s not only about democratic leadership but also having the common vision and the will to change the system.”

Prominent examples of MedTech that Professor Verdonck feels are heading in the right direction include the data generated

## Facilitating value-based care

In the context of value-based care, Professor Verdonck separates technology in this domain into three categories – digitalisation and optimisation (surgeons supported by robot assistance, for example), mobile technology, such as wearables and insideables, and data science in the forms of AI and VR. Perhaps the most important type of technology required for all of these to function effectively, however, is connection. “A reliable connection is essential to ensure the receipt of the data produced and this will act as an incentive and a driver for the use of technology before getting the value out of it.” Professor Verdonck elaborates, “you need to connect with the patient to effectively integrate the care around them” and, in this sense, technology will help towards value-based healthcare.

by wearable and insideable technology, which can assist in facilitating prevention, early detection and follow-up information when used at the correct time.

When wrapping up the conversation, Professor Verdonck takes the time to comment on the role of patients in making the most of these technological opportunities to further the healthcare system, stating that “changing consumer attitudes towards the healthcare system, as well as the attitudes of the organisers of the system so that they are parallel, will facilitate more respect from consumers to adapt and change their behaviours.”



# Recommendations

To ensure the resilience of the Belgian healthcare system, the following recommendations outline how to approach and address the challenges facing our three thematic areas – the patients, the healthcare workforce, and system efficiency.



Prioritise the implementation of comprehensive error and infection prevention programmes, supported by robust monitoring systems, to enhance patient safety and care quality.



Introduce initiatives to combat healthcare workforce burnout by leveraging technological innovations to redistribute workloads and by enhancing mental and physical health support for medical professionals.



Explore strategies to streamline processes and reduce the significant environmental burden arising from healthcare activities (namely the waste created by preventable patient safety incidents), fostering greater sustainability and resource efficiency within the system.



Develop a reformed healthcare financing model that incentivises positive qualitative outcomes, encourages the adoption of new innovations, and drives optimal performance across the healthcare system.





# Appendix

Full indicator descriptions & sources			
Indicator group	Indicator	Full description	Source
Patients	Adverse effects of medical treatment	<a href="#">Adverse effects of medical treatment – Deaths (per 100,000)</a>	IHME, Global Burden of Disease Study
Patients	Complications following therapeutic procedures	<a href="#">Complications following therapeutic procedures*</a>	IHME, Global Burden of Disease Study
Patients	AMR-related deaths	<a href="#">AMR Deaths</a>	IHME, Global Burden of Disease Study
Patients	Sepsis	<a href="#">Sepsis ASIR per 100,000</a>	Lancet Publication
Patients	HAI prevalence	<a href="#">Estimation of number of patients with at least one HAI on any day</a>	ECDC
Patients	SSI prevalence	<a href="#">Surgical site infections (composite)</a>	ECDC
Patients	HAI guidelines	<a href="#">Hospitals reporting guidelines for HAI prevention</a>	ECDC
Patients	HAI surveillance	<a href="#">Hospitals reporting surveillance as part of HAI prevention strategies</a>	ECDC
Patients	Universal health coverage	<a href="#">UHC Service Coverage Index (SDG 3.8.1)</a>	WHO Global Health Observatory
Healthcare workers	Nurses per 10,000 population	<a href="#">Nursing and midwifery personnel (per 10,000)</a>	WHO Global Health Observatory
Healthcare workers	Doctors per 10,000 population	<a href="#">Medical doctors (per 10,000)</a>	WHO Global Health Observatory
Healthcare workers	Ratio of nurses to doctors	<a href="#">Ratio of nurses to doctors (OECD)</a>	OECD
Healthcare workers	Nurses aged above 55	<a href="#">Nurses 55 and above Havas Lynx – Healing the Healers (Point.1 data)</a>	WHO
Healthcare workers	Staff burnout	<a href="#">Ratio of nurses to doctors (OECD)</a>	Havas Lynx and additional market research

Full indicator descriptions & sources			
Indicator group	Indicator	Full description	Source
Healthcare workers	Occupational health and safety policy	<a href="#">Existence of national policy instruments for occupational health and safety for health workers</a>	WHO Global Health Observatory
Efficiency	Inflation	<a href="#">Inflation, consumer prices (annual %)</a>	World Bank
Efficiency	Length of stay	<a href="#">Health care use – Length of hospital stay (acute care)</a>	OECD
Efficiency	Health expenditure	<a href="#">Domestic general government health expenditure by Health Care Functions</a>	WHO Global Health Expenditure Database
Efficiency	Healthy Life Expectancy	<a href="#">Healthy Life Expectancy (HALE) at birth (years)</a>	WHO Global Health Observatory
Efficiency	Preventable deaths	<a href="#">Potential years of life lost</a>	OECD
Efficiency	Health care % of national footprint	<a href="#">Health care % of national footprint</a>	Health Care with No Harm – World Input-Output Database (WIOD) European Environmental Agency
Efficiency	Healthcare footprint per capita	<a href="#">Health care footprint per capita (tCO2e/capita)</a>	Health Care with No Harm – World Input-Output Database (WIOD) European Environmental Agency

Full list of Belgian stakeholders interviewed		
Name	Country	Title & organisation
Dr Eva Marie Castro	Belgium	Head of Quality Department at RZ Tienen
Dr Ilke Montag	Belgium	Chairman of Board of Directors at THE Institute
Denis Herbaux	Belgium	CEO of Platform for Continuous Improvement of Quality of Care and Patient Safety / Plateforme pour l'Amélioration continue de la Qualité des soins et de la Sécurité des patients (PAQS)
Marc Noppen	Belgium	CEO of UZ Brussels
Professor Pascal Verdonck	Belgium	Professor of Biomedical Engineering and Medical Technology at Ghent University

# Barometer scoring system

## Classification

In the EMEA Healthcare Resilience Barometer, each country received an aggregated resilience score between 0-100, which is a composite measure calculated as an average of resilience scores across the three thematic areas: patients, the healthcare workforce, and efficiency.

## Indicator-level score allocation

For each of the individual resilience indicators, we converted the raw data point into a 1-10 scale, to standardise and allow for comparability. Scores between 1-10 were multiplied by 10 and presented on a 0-100 scale in the barometer to allow for the use of whole numbers for country and regional averages.

This involved creating individual ranges per indicator, where the aim was to create a range that allowed for a good distribution of the data points from each EMEA country, aiming for a normal distribution bell curve, whilst still maintaining a standard range size where possible.

For some indicators, achieving this distribution of data across the 1-10 range was not possible given the performance levels of the different countries included within the barometer. This is because the data naturally clusters heavily by region, with European countries scoring near the top of the ranges, and African countries scoring nearer the bottom of ranges for most indicators.

## Interpreting the barometer scores

As the original data points the barometer relies on are defined on different scales and measurements, the 0-100 scoring system was created to allow us to classify and interpret the data from the various sources in a standardised manner.

According to this unified system, 100/100 is the best possible score across all indicators. As the table of classification in the above section shows, a higher score is always more positive, as it indicates a higher level of healthcare resilience in a country.

To support the interpretation of the charts and tables throughout the report, the below two examples illustrate the framework used in the standardisation process.

### Indicator 1: AMR-related deaths (IHME)

For this indicator, the higher prevalence of AMR-related deaths is converted into a lower (weaker) barometer score, while a lower prevalence is converted into a higher (stronger) score on the 0-100 scale in the barometer. In other words, a low score on AMR-related deaths in the barometer does not mean that the prevalence of AMR-related deaths is low. It means that the country performs weakly on the AMR deaths measure.

Original value (death rate per 100,000)	Barometer score assigned
<18	100
>162	10

### Indicator 2: Nurses per 10,000 population (WHO)

In this case, the original dataset shows the number of nurses per 10,000 population in each country. A higher number of nurses is better from a healthcare perspective, therefore a higher number of nurses is translated into a higher score on the barometer, and a lower number of nurses translated into a lower score on the 0-100 scale.

Original value (Number of nurses per 10,000)	Barometer score assigned
<10	10
>115	100

**The scale of 0 (weak) to 100 (strong) is included in each table in this report as a reminder of how the scores should be interpreted by the reader.**





Barometer scoring system per indicator			
Indicator	Source	Original scale / unit of measurement	Barometer score assigned
Adverse effects of medical treatment	IHME, Global Burden of Disease Study	Death rate per 100,000	<0.25 = 100 >14 = 10
Complications following therapeutic procedures	IHME, Global Burden of Disease Study	Prevalence rate per 100,000	<10 = 100 >70 = 10
AMR-related deaths	IHME, Global Burden of Disease Study	Death rate per 100,000	<18 = 100 >162 = 10
Sepsis	Lancet	Sepsis ASIR per 100,000	<100 = 100 >2000 = 10
HAI Prevalence	ECDC	%	<1 = 100 >9 = 10
HAI - SSI Prevalence	ECDC	% of SSIs per 100 operations	<1.2 = 100 >10.80 = 10
HAI - Guidelines	ECDC	Number of hospitals	<10 = 10 >90 = 100
HAI - Surveillance	ECDC	Number of hospitals	<9.5 = 10 >85.50 = 100
Universal Health Coverage	WHO Global Health Observatory	Average cover of essential services	<40 = 10 >87.50 = 100
Nurses per 10,000 population	WHO Global Health Observatory	Number of nurses per 10,000	<10 = 10 >115 = 100
Doctors per 10,000 population	WHO Global Health Observatory	Number of doctors per 10,000	<8 = 10 >72 = 100
Ratio of nurses to doctors	OECD	Ratio	<4.5 = 100 >40.50 = 10
Nurses aged 55 or above	WHO	%	<4.5 = 10 >40.50 = 100
Staff burnout	Havas Lynx	Custom calculation	<6.7 = 100 >13.2 = 10

Barometer scoring system per indicator			
Indicator	Source	Original scale / unit of measurement	Barometer score assigned
Occupational health and safety policy	WHO Global Health Observatory	Existence of national policy instruments for occupational health and safety for health workers	<1 = 10 >9 = 100
Inflation	World Bank	Annual % measured by consumer price index	<2 = 100 >18 = 10
Length of stay	OECD	Average number of days spent in hospital	<4 = 100 >7.20 = 10
HC % of health expenditure (per capita)	WHO	Domestic general government expenditure per capita (US\$)	<50 = 10 >8800 = 100
Healthy Life Expectancy	WHO Global Health Observatory	Average number of years	<50 = 10 >74 = 100
Preventable deaths	OECD	Summary measure of premature mortality which may be preventable	<950 = 10 >8550 = 100
Health care % of national footprint	Health Care with No Harm - World Input-Output Database (WIOD) European Environmental Agency	%	<0.7 = 10 >6.30 = 100
Healthcare footprint per capita	Health Care with No Harm - World Input-Output Database (WIOD) European Environmental Agency	tCO2e per capita	<0.09 = 100 >0.81 = 10

# List of countries (100)

## Europe

Albania	Estonia	Lithuania	Russia
Austria	Finland	Luxembourg	Serbia
Azerbaijan	France	Malta	Slovakia
Belarus	Georgia	Moldova	Slovenia
Belgium	Germany	Montenegro	Spain
Bosnia and Herzegovina	Greece	Netherlands	Sweden
Bulgaria	Hungary	North Macedonia	Switzerland
Croatia	Iceland	Norway	Turkey
Cyprus	Ireland	Poland	Ukraine
Czechia	Italy	Portugal	United Kingdom
Denmark	Latvia	Romania	

## Africa

Algeria	Congo (Republic of the)	Libya	Senegal
Angola	Djibouti	Madagascar	Seychelles
Benin	Egypt	Malawi	Sierra Leone
Botswana	Equatorial Guinea	Mali	South Africa
Burkina Faso	Eswatini (Swaziland)	Mauritania	South Sudan
Burundi	Ethiopia	Mauritius	Tanzania
Cameroon	Gabon	Morocco	Togo
Cape Verde	Ghana	Mozambique	Tunisia
Central African Republic	Guinea	Namibia	Uganda
Chad	Guinea-Bissau	Niger	Zambia
Comoros	Kenya	Nigeria	
Congo (Democratic Republic of the)	Lesotho	Rwanda	
	Liberia	Sao Tome & Principe	

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Bahrain	Jordan	Qatar
Iran	Kuwait	Syria
Iraq	Oman	Yemen

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