Capacity-enhancing innovations in medical technology

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Incentivizing technologies that help overcome the challenges of the future

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Content

1 Executive Summary

The German healthcare system is under significant pressure caused by various reasons such as lack of investment in the hospital infrastructure through the federal states, staff shortages as consequences of working conditions and post-pandemic effect, increased costs due to inflation as well as demographic changes. In this context, the German hospital reform aims to transform a very expensive system.[1] However, the newly planned financing model, which combines continuous fix costs funding and variable reimbursement per treatment, does not consider incentives for the value of innovation – with the consequence that short-term economic considerations preferring pricing over quality will continue to dominate the orientation of the inpatient sector.

The question is whether these adjustments will be enough to bring stability to an extremely complex system that will face even greater challenges in the coming years due to demographic change. Medical professionals are already working at the limits of their capacity and reports have shown that in Germany available medical professionals per 1000 cases are significant lower as the European average.[2] This fact combined with decreasing numbers of new apprenticeships in the field of nursing are alarming.[3] Here, alternative strategies are needed to make optimal use of existing (human) resources without compromising the quality of care, employee and patient satisfaction.

A promising approach is the use of capacity-enhancing innovations, which can bring efficiencies across the continuum of care, even across sectors. Such innovations have the potential to release material and human resources that can be reallocated to improve the care of e.g., complex patient cases. However, incentives for capacity-enhancing technologies are currently limited and often insufficient. Reimbursement and procurement decisions primarily focus on the clinical value as well as pricing of products. On the other hand, funded projects such as the Innovation Fund of the Federal Joint Committee, are lengthy and only available to a fraction of innovations while they do not guarantee integration into standard care – especially in the medium term. Thus, the added value of capacity-enhancing technologies is often overlooked or cannot be implemented.

To promote the use of capacity-enhancing innovations, changes are needed at multiple levels. It will be crucial to define the value of new technologies more broadly and consider the whole patient-pathway impact including the associated opportunity costs. To measure this impact, the integration of patients, medical specialties, and qualifications is essential to establish networks for improved care and added value at a systemic level. For the creation of a resilient and sustainable health system, considering solely short-term economic factors will not be sufficient given the high complexity of the system. Rather, what is needed is a political approach towards systematic promotion and support of capacity-enhancing innovations in decision-making.

2 Limited resources in healthcare have become an increasingly serious challenge

The German healthcare system is facing massive challenges, most notably though a shortage in resources on personnel, infrastructure and financial level. As in many industries, the shortage of skilled workers is becoming more and more acute and will continue to worsen, when an increased need for treatment due to an aging population meets a limited availability of medical professionals due to demographic change.[4]

In addition, the German healthcare system has been suffering from chronic underfunding for years.[5] The COVID-19 pandemic has highlighted how the cost-saving measures of recent years have undermined the system's resilience: outdated equipment, lack of supplies, understaffed medical teams already operating at full capacity in normal circumstances. The financial pressure has not only placed the healthcare system in its current precarious state but, more importantly, also impedes the management of future challenges.

This particularly applies to the German hospital landscape, which still represents the largest cost component of statutory health insurance (GKV) but at the same time reveals increasing deficits in the quality of care for patients.[6]

Considering these circumstances, it is essential to develop sustainable strategies to address the impacts of growing financial and personnel resource constraints and ensure high-quality healthcare in the future. The planned hospital reform by the Federal Ministry of Health highlights the need for action but, aside from restructuring hospital financing, it offers limited options for a sustainable system improvement. Efficiency enhancements through the promotion of technologies and preventive measures, as well as targeted training and recruitment of medical personnel would support improving quality of healthcare despite increasing pressure. However, the current reform proposals do not recognize the value dimensions of innovations and medical technologies as response to the described challenges.

One approach that does not receive enough attention in practice is the use of capacity-enhancing innovations.[7] Capacity-enhancing innovations refer to technologies that enable the use of existing resources in a more optimal way. One example is the so called transcatheter aortic valve implantation (TAVI), a minimal invasive procedure to treat symptomatic severe aortic stenosis. The TAVI procedure not only largely improves patients' quality of life but also demonstrates comparable (and recently even better) clinical outcomes compared to traditional open-heart surgery [8], whilst bringing efficiencies for the hospital and the patient's care pathway[9] and being highly cost-effective.[10] Infrastructure and personnel resources freed up by the switch from open-heart surgery to TAVI (e.g. through reduced need for intensive care with TAVI) can be used elsewhere to improve care for patients.[11]

The optimization of capacity utilization has often not only a positive effect on the inpatient sector, but can also reduce the necessity of follow-up treatments in the outpatient sector, so that advantages have to be evaluated across the whole patient pathway. Unlike cost reductions that primarily aim to minimize or eliminate individual steps in the healthcare process in hospitals, the use of capacity-enhancing innovations allows for a more holistic optimization of the healthcare system and the processes within it. How this can be achieved and what conditions need to be met to integrate capacity-enhancing innovations into healthcare delivery will be explored in the following sections.

3 Capacity-enhancing innovations address resource scarcity on multiple levels

The concept of capacity-enhancing innovations describes the resource-freeing impact of technologies on healthcare settings. In the context of this paper, capacity-enhancing innovations comprise all medical technology solutions, which can lead to a release of material, human and/or financial resources compared to similar and often cheaper clinical solutions. The integration of capacity-enhancing innovations offers the opportunity to use the freed-up capacities elsewhere to optimize the care situation and increase the ability of healthcare organizations to perform better or operate at a higher level of efficiency.

While the evaluation of drugs has long looked at the potential for optimizing resources in addition to efficacy and safety – especially in other European countries, such as in the form of the Integrated Care Systems (ICS) of the NHS England[12] – this type of evaluation is not yet widespread in the context of medical technology applications. However, limited resources are making it increasingly necessary to assess not only the clinical value of a medical product but also its potential to optimize resource utilization within the healthcare system.[7]

There are already multiple examples of technologies that provide added value on this level:

- *Capsule endoscopy:* A minimally invasive medical procedure to record images of the gastrointestinal tract for use in disease diagnosis. By providing clear, accurate images as well as software based analytical support, capsule endoscopies support earlier diagnosis. Earlier diagnosis in turn often reduces the need, scope or length of subsequent treatment, which saves personnel and materials within the hospital.
- *Transcatheter aortic valve implantation (TAVI):* A therapeutic approach for aortic valve stenosis that offers a minimally invasive alternative to open-heart surgery. By avoiding the need to stop the heart and open the chest, TAVI improves the quality of life for patients meanwhile reducing the risk of complications and the average time of recovery for patients, but also requires noticeably lower personnel deployment than traditional open-heart surgery. This not only saves capacity for the hospital and helps to realize efficiencies, but it also relieves the burden on outpatient care and elongates the quality-adjusted life years of patients.[10] To ensure that the capacity-enhancing potential of TAVI is fully unlocked, medtech company Edwards Lifesciences has further developed a set of BENCHMARK practices to support the integration of TAVI into a hospital's individual processes and structures. The practices aim to streamline the TAVI patient pathway resulting in reduced length of stay and thereby improve resource capacities while maintaining patient safety. Practices range from education of the medical team, over decision trees and protocols for early mobilization up to criteria for discharge.[9]
- *Hemodynamic monitoring*: By combining continuous monitoring of specific vital signs and state-of-the-art software, algorithm-based predictions can be made about the occurrence of intraoperative hypotension. As a result, serious complications such as myocardial injury or acute kidney failure after non-cardiac surgery can be minimized and length of stay can be reduced.[13,14] Capacities freed up by the timely prevention or treatment of complications can be used elsewhere to improve care.

These examples clearly demonstrate that capacity-enhancing innovations are addressing the challenges facing the healthcare sector in multiple ways:

- *Release of material and human resources:* This can be achieved, among other things, by reducing the complexity of handling individual care steps, making them less labor-intensive. Alternatively, the use of technology can lower the risk of complications or support recovery, reducing the intensity or duration of patient care. Capacity-enhancing technologies can thus free up resources on the part of healthcare providers that can be allocated to the treatment of additional or more care-intensive patients. The

expected increase in patients due to the demographic shift can therefore be addressed more efficiently, relieving downstream processes in the healthcare pathway.

- *Improvement of the quality of care:* The release of capacity leads to medical benefits:[2]
    - Reducing the risk of complications or shortening the length of stay and therapy increases the vitality of patients and simultaneously enhances their overall patient experience.
    - Preserving human capacity also helps to reduce stress and overwork among healthcare personnel. The current workload at the limits of capacity for a significant portion of medical professionals in Germany inevitably impacts the quality of care, in the best case through strained interactions and, in the worst case, through medical errors. Capacity-enhancing innovations thus contribute to higher quality care with consistent patient numbers.
- *Increasing the attractiveness of the workplace:* Potential relief for healthcare personnel can also have a positive impact on staff retention and recruitment in hospitals and practices - an invaluable asset in times of increasing skilled labor shortages. Talented individuals who have the luxury of choosing their employers are increasingly looking beyond financial benefits and are selecting employers based on criteria such as work-life balance and working atmosphere.[6] The creation of efficiencies and the minimization of unnecessary extra work with the help of capacity-enhancing innovations can thus also increase the attractiveness of healthcare jobs.

Despite the medical and economic potential of capacity-enhancing innovations, they are currently incentivized only in a very limited way. However, continuous development of products at this level is necessary making remuneration at the approval or reimbursement level indispensable.

4 Approaches for increased incentivization of capacity-enhancing innovations in medical technology

Reimbursement and procurement decisions in medical technology are primarily made by comparing the short-term clinical value with the monetary costs of new technologies. Capacity-enhancing qualities are rarely taken into account—neither as a value component nor as an opportunity for long-term cost savings (considering the overall system). As a result, hospitals typically do not show additional willingness to pay for technologies with capacity-enhancing qualities. Furthermore, there is no systematic incentivization of such solutions by policymakers and payers.

The reasons for the lack of recognition and incentivization of capacity-enhancing technologies are multifaceted and include:

- *System-wide cost pressure:* The healthcare system is under significant cost pressure, which is expected to further intensify in the coming years. The consequences include comprehensive cost-saving measures that will significantly limit the scope for innovations. Established products and processes are often prioritized over innovative acquisitions in times of strained financial resources.[15]
- *Narrow understanding of the value of new technologies:* The value of medical technology solutions is typically measured by hard clinical metrics (e.g., avoidance of intensive therapy) intended to demonstrate the immediate impact of the solution on mortality and morbidity. The release of capacity that can optimize care in other areas is often not perceived as a component of value. As a result, these benefits are not considered in cost-benefit assessments, leading to a preference for cheaper products, especially in times of increased cost pressure.[16]
- *Lack of evidence for anticipated capacity enhancement*: Even in cases where capacity-enhancing innovations are attributed value in principle, they must demonstrate their cost-effectiveness. However,

there is often a lack of solid (quantitative) evidence regarding the expected optimization potential in healthcare delivery through the reallocation of freed-up capacity, such as the reduction of intensive care beds using new minimally invasive technology. The lack of immediacy of the expected effects collides with the system's fixation on immediate cost-benefit calculations.

- *Fragmented billing and missing consideration of the entire patient pathway:* Evaluating capacity enhancements often requires consideration of the entire patient pathway, necessitating an intersectoral assessment of treatment methods. Currently, this is not possible on a widespread scale due to the absence of data and the fact that treatment methods are often externally assessed solely through isolated billing, such as by health insurance providers.

How can the status quo be changed, and the adoption of capacity-enhancing technologies strengthened in practice? Due to the complexity of the problem, this requires changes on multiple levels and, most importantly, the collaboration of all relevant stakeholders:

Assuming a more holistic view and assessment of "value":

The added value of new healthcare technologies must be broadly defined considering the upcoming challenges and should not be limited to clinical parameters and pricing. Anything that contributes to making the healthcare system more efficient, resilient, and of higher quality should be factored into the evaluation of new technologies. This includes optimizations related to the utilization of resources, especially human resources, that can translate into an improvement in healthcare delivery.

This also entails an extension of the currently considered investment horizon of hospitals. Capacity-enhancing effects are not always immediately evident after integration but often improve downstream aspects of healthcare delivery. The creation of a stronger network of stakeholders and their collaboration toward better treatment outcomes after hospitalization and across the entire patient pathway should be a primary focus. These factors should be considered in the tracking and quantification of the value of such innovations, thus also factoring into their incentivization.

Embedding capacity-enhancing innovations in adapted systems and processes:

Demonstrating the positive effects of capacity-enhancing innovations on healthcare delivery is complicated by the fact that these effects cannot be achieved in isolation from the associated processes and systems. When implementing capacity-enhancing technologies, the surrounding processes should also be considered and potentially adapted. Close collaboration between manufacturers and service providers is advisable to determine how technologies can be effectively implemented in-house and how the associated benefits, such as freed-up capacity, can be optimally reallocated.

Edwards Lifesciences BENCHMARK practices to streamline the TAVI patient pathway within hospitals are a good example for such collaboration between manufacturer and service provider. The developed practices aim to unlock the full capacity-enhancing potential of TAVI and have proven to reduce patient’s average length of stay by ~25% compared to TAVI usage without the practices.[9] The freed-up resources through earlier discharge of patients can be used to treat additional or more complex patient cases.

The relevance of the surrounding systems and processes must also be considered when estimating expected capacity optimizations. Valid evidence for capacity-enhancements should not disregard the individual circumstances of hospitals or clinics.

Systematic incentivization by policy and payers:

Investments in capacity-enhancing innovations usually require more generous investment horizons than the periods considered so far in assessing cost-benefit effects (e.g., during a hospital stay). With the aim of rapid refinancing, capacity-enhancing innovations are currently often used exclusively to reduce resources, such as

staff or operating room capacities. However, a reallocation of saved resources that potentially improves care – even in downstream steps or sectors of supply – is often deprioritized in the face of financial pressure.

One reason is that service providers are currently not rewarded for cross-sectoral exploitation of capacity improvements through the application of medical technology.[7] It is therefore necessary to systematically promote capacity-enhancing innovations by politicians and payers to integrate them more strongly into care for the benefit of the overall system. Possible approaches include the mandatory consideration of capacity-enhancing qualities in purchasing decisions and/or separate remuneration or subsidies for capacity-enhancing solutions, such as those available for individual preventive measures. Existing structures such as the Innovation Fund of the Federal Joint Committee can be an approach, but often fall short and are only available to a small proportion of innovations.

5 Conclusion

Capacity-enhancing innovations offer a significant opportunity to relieve the burden on the healthcare system, both financially and in terms of personnel retention, to improve medical care and to increase patient well-being. However, the sectorized and overly narrow assessment of the added value of innovative medical technologies, as well as the lack of structural incentives on the part of policymakers and payers, represent major hurdles to their integration into care and their prioritization over non-capacity-enhancing but pricier alternatives. To ensure that the healthcare system benefits from capacity-enhancing innovations, evaluation criteria as well as potential cost savings and corresponding incentives must be considered in the context of the entire patient pathway with a systemic perspective. Only then the full potential of medical technologies is considered and can contribute to tackling the healthcare system's challenges sustainably.

6 Method

For the preparation of the position paper, a total of five experts from the healthcare sector were interviewed in addition to classic literature review. Insights obtained through the expert interviews were utilized to refine the content of this position paper and formulate demands in a realistic manner.

The following experts were asked to the topic of capacity-enhancing solutions:

- Eric Rechberger, Sana Purchasing & Logistics, Head of Strategic Procurement for Cardiovascular Medicine
- Gabriela Leyh, Barmer, State Managing Director
- Gebhard von Cossel, Sana Hospitals, Head of Corporate Medical Strategy
- Marc Schreiner, Berlin Hospital Society, Managing Director
- Dr. Alex Carter, London School of economics and political science, Department of Health Policy, Senior Lecturer in Practice

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October 2023