



## The future of precision cancer care

Earlier detection, a faster path to care, and the right treatment at the right time for every patient

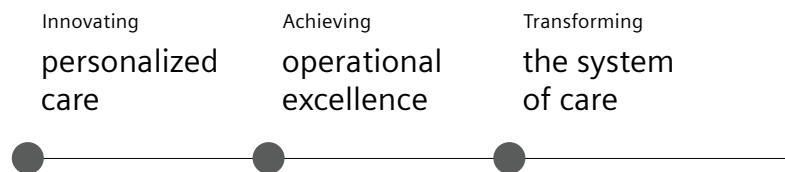
A thought leadership paper on "Innovating personalized care"

# Preface

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# Executive summary

Cancer is a disease that presents unique challenges for healthcare providers because of its complexity, the wide variety of cancers and tumors, the broad and quickly growing array of treatments, the rapid pace at which knowledge and science are advancing, and the high degree of deep expertise demanded of various medical specialists and experts. Treating cancer can be extremely expensive, not just because of the increasing number of cases and the cost of cancer treatments, but because of this complexity and the increasing challenge to make the right treatment available to every patient, when needed, where needed. These challenges combine to place enormous pressure on healthcare resources, forcing frontline providers as well as healthcare policy makers to confront difficult decisions.

This paper argues that our traditional approaches to cancer and cancer care often serve to exacerbate these challenges rather than resolve them.

A precision medicine approach to cancer can serve as an alternative, offering not only the potential of better outcomes for patients, but also offering significant benefits for providers, and indeed for entire healthcare systems.

Hearing the words “You have cancer” is a profoundly unsettling and frightening experience for any patient, and the response of both patients and caregivers is often to seek the most sophisticated care available.

The current system does not have the capacity and flexibility to make decisions based on the many relevant factors that precision medicine can identify and aggregate. As a consequence, there is often a sizable gap between the potential of precision cancer treatments and the reality that exists on the frontlines. Many patients receive one-size-fits-all treatments, and there are huge disparities between the treatments offered and the outcomes achieved at different hospitals.

Precision medicine can allow cancer to be detected earlier and with far greater accuracy, taking into account a wider and deeper range of information about each patient. It can help to identify the most effective treatments for particular cancers. And it can divert many patients away from costly and complex cancer care toward other care options that are more convenient, less costly, and more likely to result in better outcomes.

This paper analyzes the ways in which a precision medicine model can enhance and streamline cancer care and treatment, making it more efficient, more effective, and ultimately lifesaving to those who have heard the frightening words “You have cancer.”

# The challenge

Cancer presents extraordinary challenges for both patients and providers. For patients, a cancer diagnosis is a traumatic experience, forcing them and their loved ones to confront harsh realities and agonizing choices. For providers, cancer also presents an array of complex challenges. Treatments can be highly complex and costly, often with few guarantees of success, and often requiring further rounds of treatment. An avalanche of new, personalized treatments are entering the market, but many of these are very narrowly targeted, which poses challenges to widespread provision of such treatments to the patients who need them. In the past two years alone, 20 new biomarker-specific solid tumor treatments have been approved by the FDA in the U.S., and 14 in Europe.<sup>1</sup>

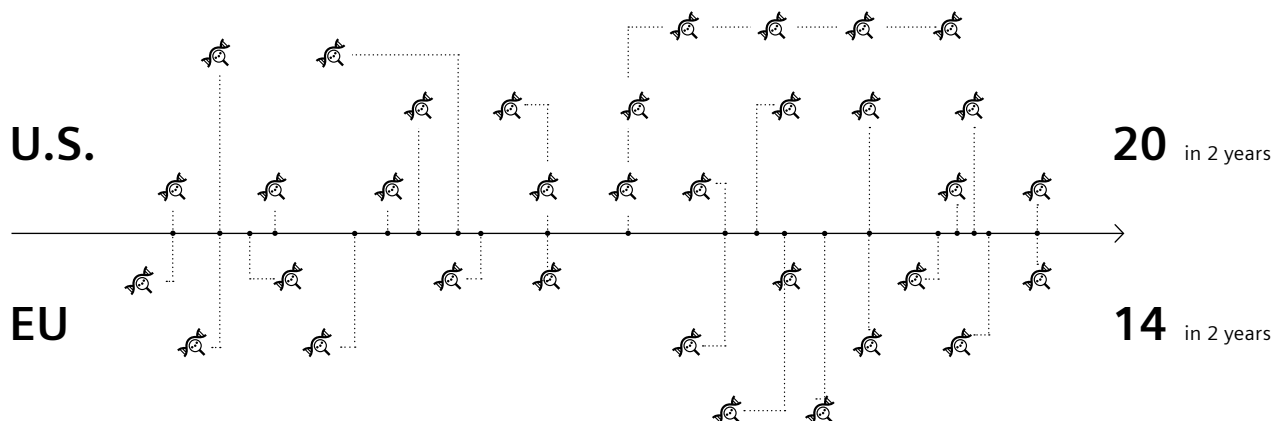
And cases worldwide will continue to rise, reaching 30 million new cancer cases by 2040,<sup>2</sup> while resources (including essential specialists like oncologists and radiologists) are increasingly in short supply. The strain cancer puts on healthcare infrastructure is immense.

For the purposes of this analysis, it can be helpful to think of cancer treatment as occurring along a continuum, with “standardized care” at one end and “complex care” at the other. In practice, these two treatment types are quite distinct from one another; a more accurate depiction might be two separate and disconnected pathways.

An example of standardized care would be a minimally invasive intervention to treat a localized lung cancer lesion. Examples of complex care would be the treatment of any cancer that has had multiple metastases, or treatment of patients with multiple comorbidities or an extensive family history of cancer.

## Rapid advance in the number of precision cancer care treatments<sup>1</sup>

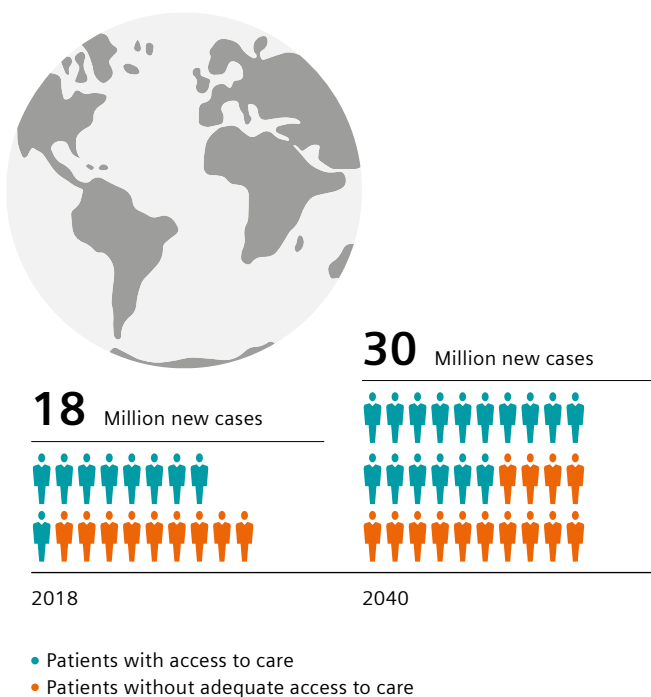
20 recent biomarker-specific solid tumor approvals relevant to comprehensive genomics profiling tests.



A third domain would be cancer care in low-resource settings. These can include remote or rural areas, where experts with specialized skills and sophisticated equipment are not available.

One of the central difficulties in cancer care today is our reliance on a one-size-fits-all approach. All cancers are essentially treated in similar ways, with surgery, radiation, or systemic therapy. Compounding this problem, many patients and caregivers have embraced the philosophy that the most sophisticated and complex care equals the “best” care.

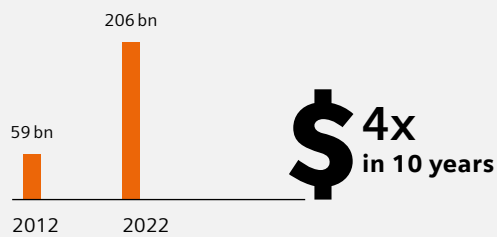
## Global cancer burden is rising



This is not necessarily so. Some cancer cases clearly are complex; these demand greater resources—more specialized experts, better technology, more tailored drugs, longer treatment time, and support from more medical sub-specialties. Yet many types of cancer, if detected early, can be successfully treated with fairly straightforward, well-established, and relatively inexpensive treatments. And many cancers can be successfully treated in low-resource settings, often closer to patients’ homes and families, minimizing disruption to their lives and reducing costs, without compromising care.

Ideally, every healthcare system would provide all patients with the right treatment, at the right time. In oncology, this requires a foresighted allocation of resources between the three different care domains. It also requires a deeper understanding, not only of the type of tumor, but about genomics, tumor markers, the patient’s family and medical history, amongst others. Precision medicine can help.

## Global dedicated oncology spending quadrupled between 2012 and 2022



# The solution

Precision medicine is not specific to oncology; it is being applied in many areas of medicine and medical research. However, precision medicine has unique relevance and potential in oncology. This is due to cancer's complexity, the many different types of cancer, the huge amount of data that is used to identify cancers and the right combination of treatment options.

Applying a precision medicine model can strengthen all three cancer care domains: standardized care, complex care, and care in low-resource settings.

## 1. Standardized care

Precision medicine can identify those at heightened risk of cancer, enhancing prevention efforts and improving the likelihood of early detection. In cases where cancer is present, this can be diagnosed and treated earlier, increasing the likelihood of effective treatments. Early treatment as a result of early diagnosis is also simpler, cheaper, causes fewer side effects, and can be performed in a wide range of medical settings.

## 2. Complex care

Precision medicine can facilitate more effective treatment of complex cancer cases by integrating data about the specific characteristics of that particular type of cancer with the unique characteristics of that patient—their DNA, family history and how they respond to treatment. Yet complex care remains expensive, time-consuming, and the likelihood that treatment will be effective is lessened as it typically involves the treatment of late-stage tumors. Complex care can also be strengthened by diverting patients away from the “complex care” path toward standardized treatment, reducing the pressure on highly trained staff and easing concerns around equipment availability (or capacity) and other scarce resources. Many patients can also be diverted to standardized care in their own communities, closer to where they live and work.

## 3. Care in low-resource settings

Precision medicine can improve cancer care in more remote, underserved, or low-resource areas. It can identify those who can be treated there and select those patients who require more complex care elsewhere, ensuring that both groups of patients get the care best suited for them. Receiving care closer to home makes these treatments less burdensome and makes it easier for patients to attend follow-up appointments or ask questions. This also allows for a more effective allocation of resources. Care in low-resource settings can also benefit from precision medicine through technological innovations such as telehealth, allowing information, diagnostics, or expertise to be accessed remotely. A patient in a small, rural community could, for example, speak directly with a specialist at a large urban centre.

*“Treating complex cancer cases today is often not financially viable. There will need to be a shift of resources that will ensure optimal outcomes in standard care, while freeing up time and resources to treat more complex cases.”*

**Wilko Verbakel**, Associate Professor, Medical Physicist  
Department of Radiation Oncology, Amsterdam UMC

## 1 Standardized cancer care: how can it benefit from precision medicine?

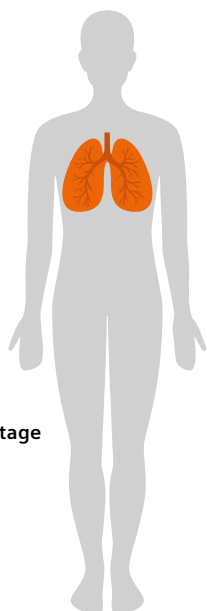
Standardized cancer care consists of applying conventional and relatively inexpensive treatments to cancers that are detected early and are still localized, and for well defined lesions that are generally well characterized and understood. In both contexts, there is a high likelihood of the cancer being successfully treated. Precision medicine can help to identify patients earlier and selects those most likely to benefit from such standardized care, and can help to ensure that their care is timely and personalized.

Precision medicine can improve standardized cancer care in four specific ways. It can: 1) enhance early detection, 2) accelerate the path to treatment, 3) identify those most likely to benefit from multimodality cancer treatment, and 4) enhance the efficacy of post-treatment screening to identify recurrences earlier.

### One year survival of lung cancer patients

 **90%**  
if cancer is diagnosed in **earliest stage**

 **20%**  
if cancer is diagnosed in **most advanced stage**



## 1. Early detection

Early detection is essential to reduce the harm caused by cancer. Early detection increases the range of treatment options, limits the cancer's spread, and often makes it possible to treat the cancer with curative intent. Here are some examples. Cancer Research UK reports that more than 90% of women diagnosed with ovarian cancer at its earliest stage survive their disease for at least 5 years. This drops to just over 10% when the cancer is diagnosed at the most advanced stage. More than 90% of patients with bowel cancer survive the disease for 5 years or more, if it is diagnosed at the earliest stage. Even patients suffering from lung cancer, the leading cause of cancer death, can benefit from early diagnosis. Almost 90% of patients with lung cancer will survive their disease for at least a year if it is diagnosed at the earliest stage; this drops to 20% when the cancer is diagnosed at the most advanced stage.<sup>3</sup>

Effective screening, early diagnosis and after screening is often difficult. It can be inconvenient for patients, and tests can be costly and uncomfortable, leading many to forego such tests in the absence of any symptoms. Targeted cancer screening is an important component of precision medicine. Such an approach can help pinpoint those most likely to benefit from screening, particularly for breast, lung, colorectal, cervical, and prostate cancer. Such screening can reduce the need for painful invasive procedures such as biopsies or surgery and, in cases where cancer is detected, increase the likelihood of effective early treatment.

In the UK, a recent evaluation of real-world data from five pilot sites for low-dose CT lung cancer screening revealed that the overall distribution of the screen detected lung cancers was 64% stage I, 17% stage II, 10% stage III and 8% stage IV.<sup>4</sup> The 81% of patients whose cancer was detected in stage I or II can usually be successfully treated with minimally invasive approaches. The financial benefits of early diagnosis are also considerable.

Treatments are less expensive, less time and attention of specialists is required, and the overall burden on hospital resources is lower. In addition, the disruption to the lives of many patients receiving standard treatment for early-stage cancer is minimized.

## 2. Accelerating the path to treatment

A second way in which standardized cancer care can be improved with the application of precision medicine principles is by accelerating the path to treatment. Treatments can often be delayed because of time-consuming manual processes, staff shortages, the complexity of cross-departmental scheduling, and a lack of data interoperability. Delays can cause psychological stress for patients, diminish the likelihood of patients completing their prescribed therapy, and can compromise the efficacy of many treatments.

This is particularly evident in radiotherapy, which cannot begin until a treatment plan has been developed and waiting times between consultation and treatment can be as long as four weeks. One important workflow step is the exact contouring of organs at risk, based on the patient's anatomy. If done manually, this is often a very time-consuming and difficult process. Cloud infrastructure together with AI can dramatically shorten this process, delivering consistent contours of more than 80 anatomical structures and localizing organs with much greater accuracy in only minutes.<sup>5</sup> At the same time, medical physicists may work remotely, resolving staffing issues in distributed systems. All of this can enable faster development of a more personalized treatment plan—potentially making the goal of same-day treatment a reality for more patients.

## 3. Multimodality cancer treatment

Multimodality cancer treatment has emerged as an important element of standardized cancer care—yet it requires treatments to be chosen that specifically deal with each patient's unique cancer situation. Multimodality care involves the opportunity to use more than one technique to treat early-stage cancer, often combining minimally invasive surgery with other techniques such as radio-frequency ablation, cryoablation and radiotherapy, and extends further to chemotherapy, immunotherapy, hormonal therapy, and targeted agents. A precision medicine approach is necessary to identify the patient's particular characteristics in order to manage, for example radio toxicity and tailor treatments to that patient's individual risk profile. Furthermore, due to developments in immunotherapy and other systemic therapies, certain patients survive much longer although they develop metastases. These metastases have to be treated with multimodality treatment approaches, in which radiotherapy often plays an important role.

With today's means of digitally supported, multi-disciplinary tumor boards (MDTs) that are provided with vetted, comprehensive clinical information and constantly examine the quality of their decisions based on outcome data, standardization of a large array of innovative treatment options is feasible and contributes substantially to improved patient outcomes and experience. In the case of disease progression, multi-disciplinary tumor boards are also responsible for taking decisions to leave a standardized care path and escalate treatment regimens to the domain of complex cancer care. In addition, deciding on the best combination of innovative treatments is only the first step. A reliable delivery of standardized care, which minimizes unwarranted variations and helps the patient to always be informed, is necessary to harvest the proposed benefits.<sup>6</sup>



4. Post-treatment screening

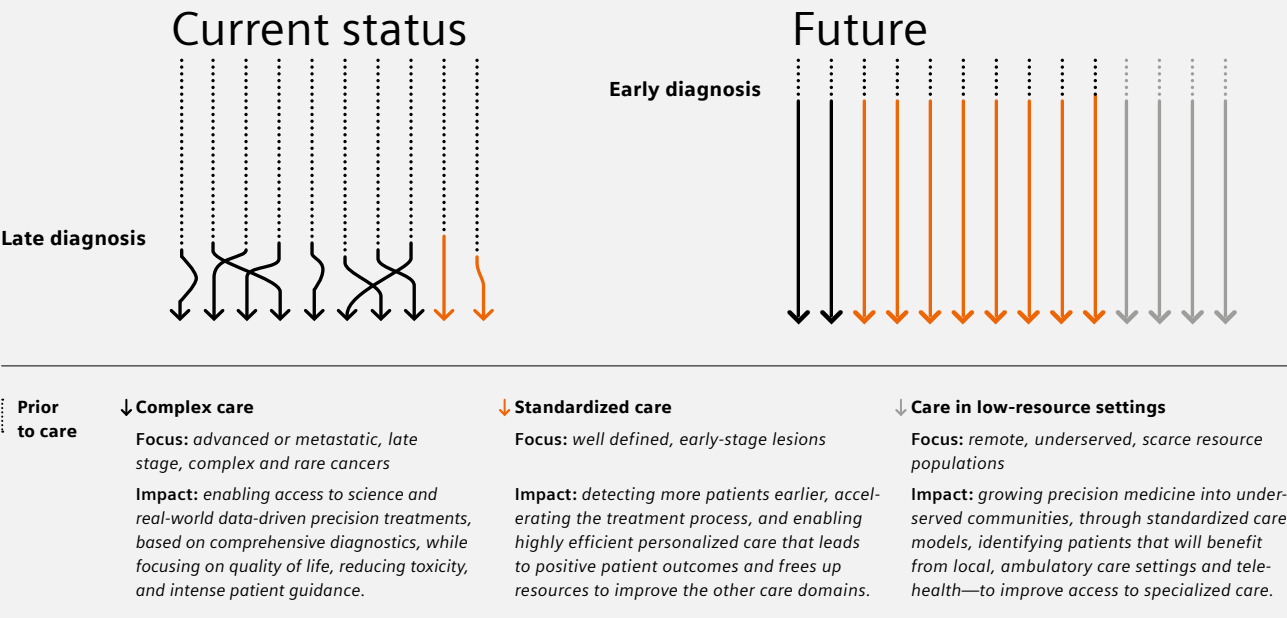
A final area where standardized cancer treatment can be enhanced is post-treatment screening. As discussed above, early screening can be highly effective for the early detection of cancers, especially with high-risk individuals. Although it has received relatively little attention in the past, targeted post-treatment screening is also essential. It is important to detect possible recurrence of cancer among patients who have been successfully cured and it is equally important to monitor potential side effects.

Connecting patients on digital platforms makes it easier for them to report outcomes and occurring side-effects, and makes it possible to initiate follow-up and ensure high compliance with ‘after-treatment’ screening regimes.

These four improvements can make standardized care more effective and help to provide care to people more quickly and efficiently. In a broader operational context, an equally valuable benefit is that many patients with cancer can be diverted from the path that leads to complex cancer care.

Earlier diagnoses enable the shift from complex cancer care to more standardized, precision cancer care

Precision medicine allows cancer to be detected earlier and identifies the most effective treatments and care pathway for each patient. This helps to transition costly and complex cancer care toward care options that are more accessible, highly scalable, and can contribute to better outcomes.



*“In the future, when a patient with a complex condition walks in, we will do imaging, genomic sequencing and collect many other data points. Based on this, we may create a plan that is highly individualized for the patient. And then we will closely monitor response and side effects and adapt at every step of the way.”*

**Professor Anthony J. Chalmers**, Chair of Clinical Oncology  
University of Glasgow, Institute of Cancer Sciences

## **2 Complex cancer care: How can it benefit from precision medicine?**

Complex cancer cases, and the need for complex cancer care, will always be with us, at least for the foreseeable future.

Complex cases often involve tumors that are less well defined, for example with locally advanced or metastatic cancers, or tumors that are of unknown origin. Complex cases can also result from a patient's unique medical history. In such cases, more time is needed to assess the causes of the cancer, analyze different treatment options, and assess the effectiveness, risks, and side-effects of various treatment paths. This almost always demands the active involvement of highly-skilled specialists from a range of disciplines, together with more sophisticated equipment. Such care is more costly and time consuming, and the likelihood of successful treatment is lower, simply because the cancer has usually progressed further.

Ensuring that patients who require complex cancer care receive the best possible care is an essential goal of all healthcare systems. A precision medicine model can ensure that care is more precisely planned for each specific patient, minimizing risks and increasing the likelihood of positive outcomes. It can also help to avoid unnecessary treatments with their associated costs and possible side effects.

### **1. The need for comprehensive diagnostics**

Identifying patients who would benefit from precision treatments depends on access to advanced diagnostics. The good news for both patients and providers is that major breakthroughs have transformed both screening

strategies and treatment decisions. Innovative technologies such as next-generation sequencing, liquid biopsies, digital pathology, and AI-powered image analysis<sup>7</sup> are driving a revolution in precision cancer care.

Thanks to these advances, our understanding of tumor biology is growing rapidly, which in turn is improving diagnoses and treatment selection. This approach creates the opportunity to achieve the very essence of precision cancer care: highly personalized and tailored treatment plans, access to the widest possible range of personalized treatments, and streamlined execution of multiple treatments, all of which contribute to improved outcomes.

### **2. Information and decision-support tools**

As our understanding of cancer and tumor biology expands, so does the need to support physicians with pre-processed information and decision-support tools. The digitalization of hospitals, data-sharing, real-world data generation, and AI and machine learning will all play a growing role in the delivery of complex cancer care.

Physicians can be supported and guided based on thousands of data points which can now be gathered and analyzed. The potential for real-time information exchange means they can benefit from data insights from similar patients treated elsewhere.

Two examples:

2.1. Functions to identify similar patients are emerging in clinical routine, at its simplest form identifying a lesion on an imaging dataset and querying large databases for patients with similar findings to then compare clinical data and prescribed treatment pathways.

2.2 Rapid advances in image quantification and research in generating radiomic data across modalities, enhancing the abilities of physicians to achieve a standardized, image and histology based tumor classification, that may guide treatment in a more objective, evidence-based way.<sup>7</sup>

In addition to the support that information and decision support tools can provide to physicians, they increasingly become tools to keep patients informed, promote treatment compliance and enhance patient experience.

### 3. Centralization of cancer services

The progress we see in precision medicine for complex cancer care holds great promise to change how medicine is practiced and research is done. At the moment, however, these developments are being held back, because new approaches require highly specialized knowledge and infrastructure, and are expensive.

One approach to this challenge is to build specialized cancer care centers that can deliver better, faster, more efficient care to more people by combining resources under one roof.<sup>8</sup> The consolidation of equipment and expertise in one setting creates a perfect situation for precision medicine to be applied and practiced.

Cancer Centers of Excellence rely on digitalization and precision medicine to seamlessly integrate a wide array of different services in one location, and many digital tools are available to support such an effort. Combining services and integrating expertise is a trend throughout the healthcare industry, offering numerous advantages including opportunities for greater administrative efficiency, a more comprehensive service offering for patients, smoother internal processes, and more seamless alignment amongst various specialists and departments. Centralization also raises new challenges. The need for patients to leave one hospital and go to another can mean a significant hurdle with accessing highly specialized care. Distances can be long and travel expensive. In addition, referring patients may be impeded by misaligned incentives and information may be lost along the way.

As costs make it prohibitive to recruit specialized knowledge and rebuild comprehensive infrastructure at every hospital, scalable models have emerged to share precision cancer care resources amongst wider hospital networks.

In these operational models, specialized services are centralized. Comprehensive diagnostics, such as genomics, bioinformatics, and AI-based image analysis, as well as personalized treatment planning and the orchestration of highly specialized, multi-disciplinary tumor boards across institutions are amongst the most common implementations.

While resources can be used most efficiently and research can benefit from the large amount of well standardized data available, the patient remains with his or her trusted physician, enhancing the patient experience, while improving access and strengthening the willingness to refer patients to the best care available to them.

### **3 Precision medicine and cancer care in low-resource settings**

Providing high-quality cancer care to patients in low-resource settings is an ongoing challenge. Low-resource settings can be isolated or rural areas, yet they can also exist within large cities and in parts of affluent countries. For various reasons, access to highly skilled experts and sophisticated equipment is often limited in such settings. Yet the need for cancer care in such healthcare settings is as high as anywhere else and while the demand rises, due to patients having easier access to information about treatment options, it has been difficult to extend care to such settings. Precision medicine can help overcome some of these obstacles.

The first benefit of precision medicine is, as discussed above, the ability to place patients on the right cancer care path. By combining deeper insights into a patient's medical history and providing an earlier diagnosis, it becomes significantly easier to identify those patients who can be treated locally, receiving various types of standardized care. This can provide those patients with precisely the care they need, while also diverting them from the more difficult, time-consuming, and expensive complex care path. Providers extending their services to such areas may consider three distinct areas to closely look into:

#### **Strengthened ambulatory care**

The rise of ambulatory care centers is a recognized trend among healthcare providers across disciplines. Indeed, ambulatory surgical centers (ASCs) are projected to outperform other forms of care provision with an annual

growth rate of six percent until 2023.<sup>9</sup> With its ability to bring care to where patients are located and significantly lower operating costs in terms of staffing, space and medical equipment, this type of care is almost tailor-made for low-resource settings.

However, due to the fact that there are only limited opportunities to provide highly-specialized staff, it is important to scale standardized processes from the standard care domain across locations to enable high-quality care. This development is supported by trends that seem likely to support the growth of ambulatory care in the coming years. These include:

- Digital connectivity and cloud-based, tech-enabled services that support ambulatory care in increasingly complex medical areas such as cancer care. Network-based infrastructure for remotely operating imaging equipment or radiation therapy planning is one example of this. Expert knowledge for imaging or treatment planning across multiple locations can be provided, alleviating the pressure to re-locate highly skilled staff to remote locations and streamlining operations.
- Patient demand for advanced treatment options that will continue to rise as knowledge spreads about treatment options. Active engagement in patient awareness campaigns and the enhanced market transparency promoted through the use of shared decision-making tools may accelerate this trend to the advantage of organizations embracing ambulatory care as a growth option.
- Pressure from health systems to improve coverage and lower the cost of care provision that will continue to grow.

## Digital outreach

In 2021, more than 200 million people globally connected to mobile internet for the first time, bringing the total to 4.19 billion people (53% of the global population). While the biggest growth rates for mobile phone use are projected to come from Asia-Pacific, Africa and Latin America. North America is also projected to see a growth by 12 million subscribers by 2025.<sup>10</sup>

The further spread of mobile internet may be instrumental to solving one of the biggest challenges to providing care in low-resource settings: access to expertise. When in the past a patient needed to see a specific expert, that patient often had to travel long distances to a comprehensive cancer center, which may not have been affordable. Today, this expertise can often be provided remotely, reducing the time necessary and alleviating financial pressure.

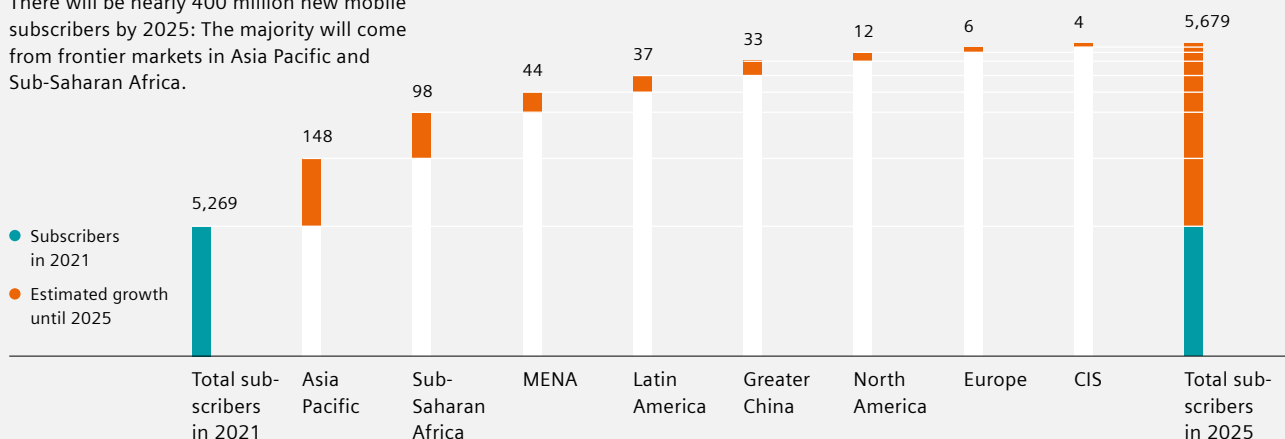
In addition, oncological, digital connectivity platforms have gained ground, improving care coordination and patient involvement and facilitating the remote collection of relevant data. Given the relatively low investment and the scalability of mobile internet-based approaches, they are poised to play a key role in granting access to populations in low-resource settings.

## Cultural barriers

A prominent barrier to access in many low-resource settings is that there are differences in knowledge, attitude and associated cultural beliefs, and these strongly influence the acceptance of screening and other medical procedures. This cultural dimension is often underestimated when implementing a precision medicine-based approach to cancer care.<sup>11</sup> Population specific outreach and communication are key to successfully implementing such programs.

## Growing mobile internet access will foster access to care

There will be nearly 400 million new mobile subscribers by 2025: The majority will come from frontier markets in Asia Pacific and Sub-Saharan Africa.



# Executive strategies

We believe designing and implementing precision cancer care along the three domains outlined above can pave the way for an era of precision cancer care that is built around the needs of patients, ensuring the right treatment at the right time for every patient. Executing this approach will require health systems, hospitals and other big healthcare organizations to adopt certain principles and prepare for significant change, at the organizational, technology and financial levels.

## Organizational

At the organizational level, it will require a culture change. Hospitals, and indeed broader health systems, need to shift their focus to prevention and early detection—meaning public health, screening in advance of a potential cancer diagnosis, consistent follow-up of diagnostic work, and post-treatment screening. Implementing this shift in focus to prevention and early detection. This will be implemented through investments in the improvement of public health, screening in advance of a potential cancer diagnosis, consistent follow-up of diagnostic work, and post-treatment screening. Diagnostic resources will be diverted to earlier stages of the patient pathway, while therapy resources may shift towards minimally invasive procedures.

## Technological

Precision cancer care is, and will be, driven by technology. The future will see increased dependence on AI and real-world patient data analyses. Hospitals should be preparing for that. In addition, patients will be digitally involved in timely reporting of treatment response and side effects and feel more in control of their own health. All of this will only be enabled by processing a constant stream of data, which will require a high level of coordination and standardization to be useful; an undertaking that will only be possible in close coordination and collaboration with technology and data-science partners.

Finally, health systems will be able to offer electronic navigation and personalized treatment scheduling, ensuring that patients are able to access the right expert team and hospital. Too often today, patients feel lost in the system, which in the context of a battle with cancer can be particularly overwhelming.

## Financial

The best way that hospitals can prepare for a future delivering precision cancer care is to ensure that their resources are being directed in such a way as to make that future possible. As noted above, shifting resources to improve screening and early detection will be critical, both from a patient outcome point of view and also in terms of cost and revenue—the earlier cancer is detected, and the more effective treatment becomes, the less expensive it is to treat.

In addition, it will be necessary to embrace outcome-based payment structures. Currently there are too many misaligned incentives in healthcare, and these often lead to the opposite of precision care, because they reward the care that earns the most money over the care most likely to be effective. Furthermore teams often are incentivized to start treatment within their own department, while alternative treatment options would be more effective and less costly. In the future, predictive diagnostic markers and relentless execution of standardized processes will gradually eliminate unnecessary treatments and subsequent side-effects.

## Key takeaways

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Early detection requires a cultural shift and building teams with experts who oversee the entire field



Enable technology to bring the power of real-world data and artificial intelligence to cancer care



Ensure that financial resources are being directed so that future precision cancer care is possible

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## Conclusion

*“A more differentiated and science-based approach to precision cancer care will open up the resources necessary to provide the highly personalized care that every patient needs.”*

**Matthias Guckenberger, MD**

Professor and Chairman, Department of Radiation Oncology  
University Hospital Zurich (USZ)

Much of today's medicine, including in the field of cancer care, continues to be based on a “one-size-fits-all” model. And where targeted therapies are possible, they are often impractical to scale. Precision medicine can help to overcome this, making it possible to provide the right treatment at the right time for every patient.

This paper has identified a range of areas where cancer care can be enhanced through a more rigorous application of precision medicine principles and models. Applying precision medicine across the board in cancer care can offer more patients a future that is less invasive, more targeted, and more predictive in terms of treatment and treatment outcomes, increasing their chances of survival and living a healthy life.

The potential of precision medicine extends far beyond oncology. The essential principles of using improved diagnostics and comprehensive, real-world data to adapt care to patients' individual needs, using automation to support operators and leveraging AI to assist physicians with decision-making, are already being applied to a wide range of medical processes. At the same time, standardized care can be scaled to lower-resource settings, improving access for more rural and other underserved communities.

Defining the optimal next steps for any patient depends on pinpointing exactly where that patient is on his or her disease care path and identifying what options are available to move ahead. This is independent of the level of resources and treatment options actually available. Putting scalable technologies into play, precision medicine can be applied across the entire continuum of healthcare. Precision medicine can serve as a navigation tool for all stake holders in healthcare, identifying obstacles, providing customized options, and illuminating the way forward.

As patient twinning, precision therapy, and artificial intelligence continue to advance, the impact of precision medicine will continue to grow.

Supported by greater consistency in technology, for example with harmonized standards, processes, and reproducibility, physicians will not only be able to serve patients better and faster, but will also be able to lower healthcare costs by reducing unwarranted variations, eliminating waste, and improving access to personalized treatments for all.





## Suggested follow-up on

[Siemens-healthineers.com/precision-medicine](https://www.siemens-healthineers.com/precision-medicine)

- Siemens Healthineers Insights Series, Issue 1:  
Five steps every hospital CEO should start today.  
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- Siemens Healthineers Insights Series, Issue 6:  
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- Siemens Healthineers Insights Series, Issue 7:  
Do one thing, and do it better than anyone else.  
Available at: [siemens-healthineers.com/insights/news/martini-klinik-specialization-optimization.html](https://www.siemens-healthineers.com/insights/news/martini-klinik-specialization-optimization.html)
- Siemens Healthineers Insights Series, Issue 32:  
Emotional care: the overlooked element in the cancer pathway.  
Available at: [siemens-healthineers.com/insights/news/emotional-cancer-care](https://www.siemens-healthineers.com/insights/news/emotional-cancer-care)



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Siemens Healthineers

Susanne is a mission-driven thought leader, focused on shaping the future of precision medicine and oncology with a demonstrated track record of engaging others in a big vision to make personalized treatments accessible for all. She establishes strong global relationships with health-care executives, works alongside physicians, patients, and governments, rolls out strategies and operations from zero to one, builds passionate teams and represents the company as a keynote speaker at conferences around the world. She formerly worked as a translational biomedical scientist at Harvard Stem Cell Institute, WHO, and Peking University.



**Reto Merges**

Global Head Expanding Precision Medicine  
Siemens Healthineers

With more than 10 years' leadership experience in health-care marketing, Reto Merges has a strong track record in building effective teams for clinical and innovation marketing. In addition, he has four years of work experience in China, ramping up efforts for research collaborations in China and South Korea. He holds a degree in electrical engineering and information technology from the Karlsruhe Institute of Technology, Germany, and has studied at the Nanjing Normal University, China. His scientific background is in the field of medical imaging, where he has authored many publications and holds multiple patents.

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As a leader in the industry, we aspire to create better outcomes and experiences for patients no matter where they live or what health issues they are facing. We innovate sustainably to develop scalable solutions that can be tailored to the needs of healthcare providers, and the local health infrastructures.

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