



One-stop cancer care

Building a digitalized Oncology Center of Excellence

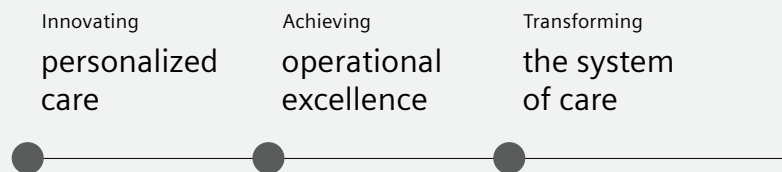
A thought leadership paper on “Transforming the system of care” and “Innovating personalized care”

Preface

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Executive summary

Cancer poses significant challenges to healthcare systems worldwide. It is a uniquely complex disease, the range of treatment options are vast, and the costs associated with cancer care are high. The challenge is further compounded by the fact that cancer cases continue to climb at a troubling rate; cardiovascular disease, by comparison, has seen a downward trend in recent years in both incidence and mortality rates.

Yet the battle against cancer has also seen important victories and breakthroughs in recent years. Technology and treatment options continue to evolve, prevention and detection strategies have grown more sophisticated, and digitalization offers remarkable new opportunities to better understand the disease, analyze data, share information, and engage more effectively with patients and their families.

The development of Cancer Centers of Excellence can offer a way to effectively tackle many of these challenges at the same time, while also taking maximum advantage of the new advances and opportunities that exist in oncology today. Integrated, multi-disciplinary cancer centers that combine facilities, equipment and specialists under one roof can offer benefits to both providers and patients. Such centers can enhance efficiency, offer patients more seamless and convenient care, and provide competitive advantages through differentiation.

This paper analyzes the emergence of Cancer Centers of Excellence, identifies the elements that are necessary for such centers to succeed, and provides an overview of the essential role played by digitalization.

Effective Cancer Centers of Excellence require well-functioning multi-disciplinary teams; they must bring together people and technology in ways that leverage their value, integrating services and specialists into one flagship facility. They must maximize efficiency, for example through creative staffing solutions to help overcome workforce shortages, and must leverage their size to invest in necessary technologies, for example genomic testing capability.

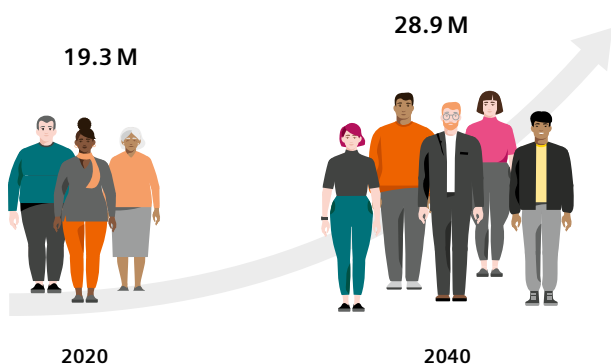
They must deploy digital solutions that provide opportunities for caregivers and patients to engage more directly, for example by giving patients the opportunity to self-report outcomes or symptoms while receiving outpatient chemotherapy. And, as patient expectations are changing, they must offer patients and their families a more “consumer-friendly” experience.

At this important moment in the history of oncology, Cancer Centers of Excellence can offer meaningful benefits. But such centers must be carefully planned, skillfully managed, and must maintain a strong focus on patients.

Introduction

Cancer continues to be one of the world's leading causes of death, despite a global effort to combat this disease that stretches back hundreds of years and significant recent breakthroughs. While cardiovascular disease—another leading global cause of death—has seen a downward trend in recent years in both incidence and mortality rates,¹ newly diagnosed cancer incidence continues to climb. The International Agency for Research sponsored by the World Health Organization (WHO) estimates that the number of new cancer cases will increase by almost 50% in 2040 compared to 2020.²

**Estimated number
of new cases worldwide²**



Opportunity

Remarkable cancer breakthroughs such as advanced screening and new treatment approaches such as immunotherapy are milestones toward a world without fear of cancer.

The climbing numbers of cancer cases not only have a profound impact on patients and their families, they also have broader implications for healthcare systems and health budgets. While it is difficult to arrive at an accurate figure for the global costs of cancer, the annual costs of cancer care and treatment in the U.S. alone have been estimated as upwards of US\$200 billion.³ Costs relative to GDP are also climbing. It has been estimated that the costs associated with increasing numbers of patients, cancer survivors, and growing per-patient treatment costs are driving national healthcare costs to outpace U.S. GDP growth by 1.1% over the next decade.⁴

While these figures are troubling, there is also cause for optimism. Over the course of the past half-century, we have witnessed a broad range of remarkable cancer breakthroughs. Research has provided a deeper understanding of the complexities of cancer. Initiatives like the Cancer Genome Atlas and Pan-Cancer Analysis of Whole Genomes have revealed important clues to new cancer treatments. There have been breakthroughs with anti-cancer drugs, including drugs that target certain cell-cycle proteins, and new therapies that target the immune system. And these breakthroughs have produced clear and encouraging results: in 1971 only one half of patients in the U.S. would live five years beyond their initial cancer diagnosis. Fifty years later, that figure has climbed to close to two-thirds.

The challenge

The challenges facing all those affected by cancer are clear. The major challenges, from a clinical standpoint, can be classified into two broad categories:

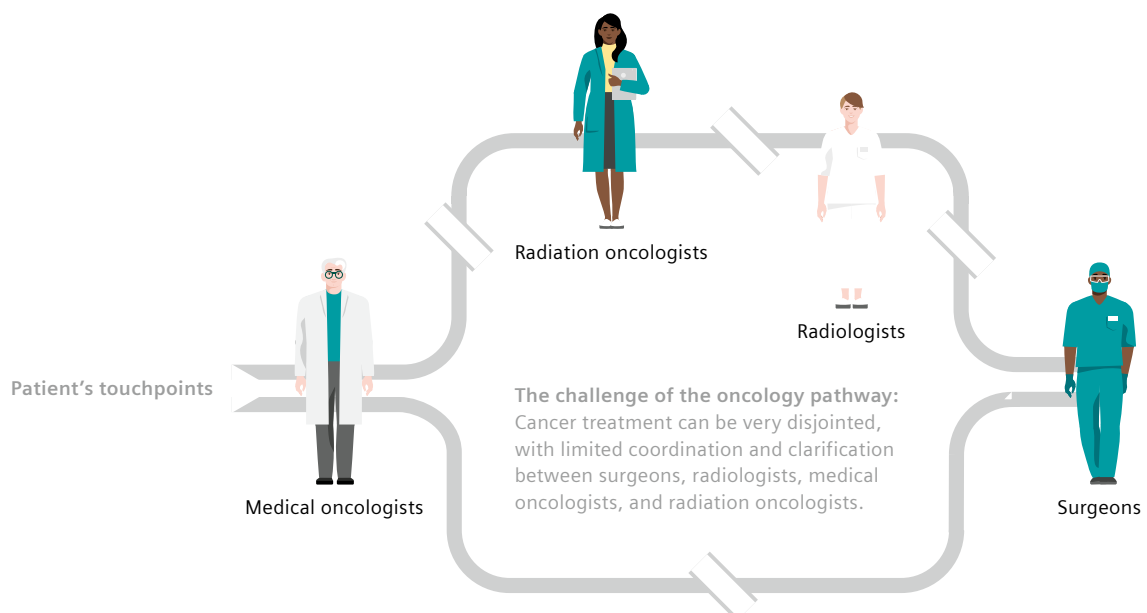
1 Cancer is a complex disease and it requires precision medicine which is data-intensive

Despite recent breakthroughs and medical advances, the complexity of cancer remains immense. Data-intensive precision medicine holds significant promise—yet the volume of this data is vast and continues to grow at a staggering pace.

In 1950, it was estimated that the time required for the total volume of medical knowledge on cancer to double was fifty years. By 1980, this figure had dropped to 3.5 years. Today, it is estimated at 73 days.⁵ For experts to remain at the forefront of current research in their

respective field requires either very narrow specialization or a massive commitment of time and effort. It has even been argued that the current wealth of information available for decision-making exceeds human cognitive capacity.⁶

Artificial intelligence (AI) and digital technologies can sift through the vast amount of information to help clinicians make better decisions. Through the deployment of machine learning, computer programs can distinguish subtypes of cancer that even experienced pathologists struggle with.⁷ Automatic contouring tools allow for significant time saving in treatment planning.⁸ And leveraging population-scale data helps physicians predict the trajectory of the disease enabling them to plan more targeted therapy. In 2021, it was estimated that AI technologies to manage healthcare tasks generated cost savings of US\$6.6 billion. By 2026, this figure could reach US\$150 billion.⁹



“We are delighted to partner to bring much-needed affordable quality cancer care services to more Filipinos. By combining local knowledge and high-quality care with operational and clinical expertise, we have a unique opportunity to redefine cancer care in the Philippines.”

Paolo F. Borromeo
CEO and President, AC Health

2 Patient expectations for coordinated care between their cancer specialists are increasing at the same time as oncologist shortages are intensifying

Patient expectations for coordinated care between cancer specialists are increasing at the same time as oncologist shortages are intensifying. Patients are increasingly approaching aspects of their medical care as engaged consumers, seeking second opinions, searching for the best specialists, and doing independent research on the unique requirements of their particular illness. This is especially true for cancer patients largely as a result of the acute nature of the disease. Taking care of an individual patient's unique needs requires that healthcare providers actively involve the patient along the entire continuum of care. However, a typical cancer treatment pathway can be very disjointed with limited coordination across disciplines. Today's cancer patients seek more than just treatment for their disease; they want a cancer program that includes them in decision-making, educates them about treatment options, and keeps them updated on the progress of their care.

The best cancer programs will be those that actively involve patients and their families in all aspects of their care.¹⁰ While patient expectations are increasing, oncologist shortages are at the same time intensifying. According to the most recent “2021 ASCO Snapshot: State of the Oncology Workforce in America,” more than 20% of practicing oncologists are nearing retirement age.¹¹ Additionally, of more than 15,000 specialty physicians interviewed by the American Medical Association, burnout rates ranged from 29% to 54%.¹² The shortage of radiologists is also projected to worsen in the next decade.¹³ These challenges can lead to increased physician turnover, decreased patient access, and increasing costs. As Dr. Barbara Aneny, former president of the American Medical Association, says, “We really have to look at restructuring our delivery of oncology care so that every oncologist can be as efficient as possible in seeing as many patients as possible, because this wave we are going to see of patients with later-stage cancers—this is just the tip of the iceberg.”¹⁴

The solution

To tackle these challenges in cancer care, many hospitals are focusing their efforts by building dedicated Cancer Centers of Excellence (CoEs) powered by digital technologies. These centers serve the needs of both patients and caregivers by combining facilities, equipment and specialists under one roof. Advanced digital technologies also help to significantly improve clinical and operational efficiency by tapping into the power of machine learning for cancer detection, decision-making, and development of treatment recommendations.

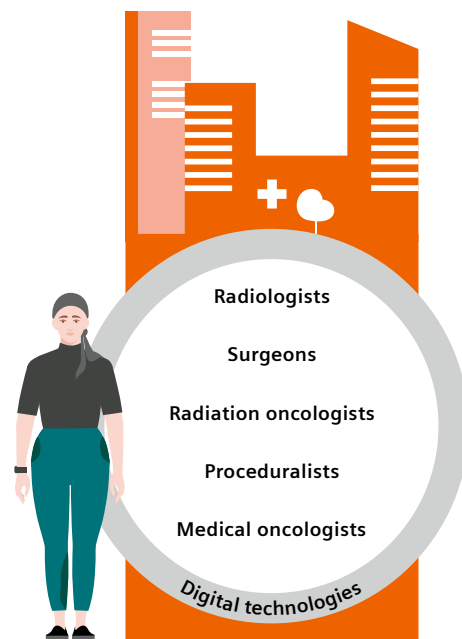
Such a multi-disciplinary approach, supported by digitalization, can deliver more effective care, contributing to improved outcomes. A dedicated Center of Excellence can also offer significant competitive advantages by providing more attractive care, enhancing efficiency, offering more convenient services, and creating clear differentiation. This trend is picking up speed and is already being adopted by forward-thinking health systems. AC Health in Manila, Philippines, for example, has established an Oncology Center of Excellence that will be equipped with the latest digital technology, making it the first dedicated center and offering the most comprehensive cancer care in the country.¹⁵ Another private regional healthcare provider called HMI group with locations in Singapore, Malaysia, and Indonesia has invested more than US\$24 million to launch new medical technologies and digitalization platforms, including further developing a Center of Excellence for oncology.

A full range of multi-disciplinary services under one roof supported by digitalization

This paper discusses the important elements in building a successful Oncology Center of Excellence.

The three focus areas for an Oncology Center of Excellence:

- 1 Building multi-disciplinary teams of specialists organized by tumor type
- 2 Bringing expertise together
- 3 Engaging patients and empowering caregivers



1 Building multi-disciplinary teams of specialists organized by tumor type

A successful program seeks to coordinate care from screening, diagnosis, treatment, survivorship, and prevention. The cancer center leadership team must effectively coordinate programs across these different areas and bring together a multi-disciplinary team of proceduralists, surgeons, medical oncologists, and radiation oncologists to execute a care plan based on proven clinical pathways for patients.

Typically, cancer center leadership will include oncologists and other cancer providers in a structure to ensure that program goals such as quality care and coordination are achieved. A multi-disciplinary cancer committee will also coordinate key activities related to clinical data sharing and guidelines development, develop and enforce policies related to patient care provided in the clinical programs.

The next level is the tumor-site specific leadership and multi-disciplinary committee. They are clinically focused and set tumor site standards of care across the system. They develop treatment guidelines and pathways, monitor clinical activity and provider performance, oversee tumor boards and multi-disciplinary clinics, and develop recommendations regarding strategic, clinical, technological, and research partnerships at the tumor site level.

Besides having a multi-disciplinary leadership team, it is essential to recruit a qualified team of talents. A highly functioning Center of Excellence also requires other disciplines to be well-staffed—a task made more difficult by the widespread shortage of healthcare workers.¹⁶

The shortage of qualified radiologists is of particular concern. A shortage of radiologists can lead to increased turnaround times for study results, which can negatively impact patient outcomes.¹³ One recent study found that radiology imaging delays are an independent predictor of length of hospital stay.¹⁷

There are creative ways in which these workforce shortages can be addressed. When healthcare organizations implement new systems, the need for highly skilled and trained technologists becomes vital. Qualified personnel must often be sourced, trained, and onboarded, putting a strain on organizational resources. To bridge any staff gaps, cancer centers can employ flexible expert technologist staffing solutions, with medical technology companies supplying trained and vetted technologists, such as radiologists, for a period ranging from a few months to several years, with specific expertise in clients' systems. These technologists are ready to integrate seamlessly into the work of a cancer center with minimal training and supervision from in-house staff.

For cancer centers with multiple locations and a mix of new and legacy systems, leaders and administrators can benefit from a centralized hub that allows quick identification and dispatch of appropriate staff to appropriate locations. Such digitalized platforms allow automated dispatching of existing full-time employees in combination with any short or long-term on-demand talent, reducing financial burdens as well as the stress placed on existing staff. Other tools such as remote scanning support for specialized equipment such as CT or MRI can also enable a Center of Excellence to run diagnostic routines at full scale even when facing a shortage of qualified technologists.

2 Bringing expertise together

The single greatest advantage of a Cancer Center of Excellence is the comprehensive and integrated services offered under one roof. An effective Center of Excellence is a multi-disciplinary flagship facility bringing together services and specialists. This allows it to serve as a one-stop destination for patients, providing a full range of cancer care services.

This demands that a wide array of professionals with complementary skills work closely together, sharing the latest evidence in their respective fields, pooling their expertise, and exchanging information. With the rise of precision medicine, especially in the area of molecular analytics which utilizes cancer genomics to find a targeted treatment based on mutations identified, patient treatment plans can be highly customized. This often requires multi-disciplinary tumor boards, at which healthcare professionals from various disciplines come together to ensure that decision-making is optimized, especially for patients with complex malignancies.

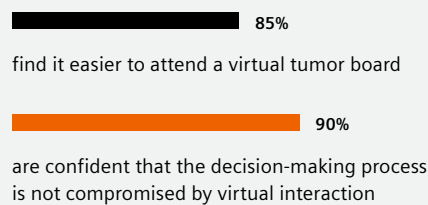
A digital oncology Center of Excellence should not only offer such tumor boards, but should also conduct them virtually. A study has shown that over 85% of physicians find it easier to attend a virtual tumor board and almost 90% are confident that the decision-making process is not compromised by virtual interaction.¹⁸ Virtual molecular tumor boards assist providers in personalizing treatment planning by allowing for prospective case reviews related to diagnosis, treatment, symptom management, and supportive care. They also provide molecular analytics by utilizing cancer genomics data such as gene sequencing, biomarkers, or variants, to identify targeted treatments based on identified mutations.

Telehealth technologies add a further element to this equation. Many renowned cancer centers have embraced telehealth solutions to build partnerships beyond their geographical borders. Memorial Sloan Kettering Cancer Center (MSKCC) in New York has a remote second opinion program in India. Patients in India can get a second opinion from the experts at MSKCC, where an oncologist can review a patient's medical records, test results, and other materials without the patient incurring the prohibitive costs of traveling to the U.S. The MSKCC expert can then provide a comprehensive written opinion or participate in a video conference with a local oncologist to review the patient's diagnosis, develop a care plan, or answer questions the patient or local physician may have.¹⁹ When needed, patients can also be brought to New York for treatment through MSKCC's concierge service.

A virtual tumor board platform

A way to enhance decision-making for complex malignancies.

Physicians



3 Engaging patients and empowering caregivers

Patient engagement has received increasing attention in oncology and is an important part of cancer care centers' efforts to attract and retain patients. Patient engagement can help patients to make decisions and implement behavioral changes that result in greater patient satisfaction,²⁰ better outcomes, and lower costs of care.^{21,22} Another key element, as pointed out by Isabel Nieto Alvarez, an expert in patient experience, is that "early detection of distress, negative affect, anxiety or possible depression and appropriate mitigation is critical in the cancer pathway."²³ It is increasingly feasible to use digital methods, especially via self-reported free text analysis, data analysis and data modeling, to collect and identify anxiety and affective states. Studies have shown that patients who self-report outcomes while receiving outpatient chemotherapy enjoy a better health-related quality of life, less need for hospitalization, and better quality-adjusted survival.²⁴

Digital patient outcomes management solutions are tools to engage patients, allowing them to report their symptoms in real time. By collecting and accessing these rich data insights, care teams can make more informed decisions. Through automated prioritization, they can also intervene with those patients who have the most critical need.

Oncology Centers of Excellence should also be equipped with digital tools to empower caregivers. For example, by using electronic referral systems caregivers can improve the speed at which cancer patients move through the care pathway, while also reducing the time medical administration teams spend facilitating the referral of patients for treatment.

When it comes to deciding on the right treatment, digital tools such as clinical decision support are not replacing the physicians' authority but rather providing and classifying relevant information that allows specialists to make even better and more informed decisions, for example by displaying the appropriate clinical evidence or recommending a treatment pathway.

With the support of machine learning capabilities, there are digital tools that can quickly explore different clinical criteria options to create customized or optimized treatment plans for each individual patient.

Another area in which Cancer Centers of Excellence should consider investing in is genomic testing capability, in order to create a digital twin of a patient to ultimately predict a patient's response to different treatment options and guide decision-making. Advanced genomic testing and data analytics can help identify the DNA alterations that may be driving the growth of specific tumors. Information about genomic mutations that are unique to an individual cancer can help doctors to identify treatments designed to precisely target those mutations.

Investing in an in-house laboratory and data analysis software allows the cultivation of local expertise in both oncology and molecular testing interpretation, which in turn makes it easier to stay abreast of new technology and better serve the community. Having these capacities in-house also allows greater quality control and makes it possible to better determine the appropriate turnaround time for reporting results.

To differentiate and promote awareness of the center, a portfolio of state-of-the-art imaging and medical equipment is vital. The Cancer Center of Excellence needs to be able to offer the broad range of services under one roof that patients and referring physicians demand. Such investments do, however, require considerable financial investment. Many healthcare providers are looking to unlock “frozen” capital by shifting medical infrastructure investments from one-time capital outflows to financial arrangements that are more aligned with their projected revenue streams. A number of innovative business and financing models have thus been developed to allow healthcare providers to do so, while also retaining flexibility to upgrade technology and reduce financial risks. These include unitary payment models, by which capital investments and service fees are rolled into a regular flat fee, or pay-per-use models where payment is made per scan, test or report. For those who want more flexibility, another option could be a subscription model or performance-sharing model, where payment is tied to predefined key performance indicators.

Digital technologies supporting Oncology Centers of Excellence



Staff management tool



Virtual tumor board



Patient outcomes management solutions



Genetic testing and analysis capability



Clinical decision-support



Telehealth



Electronic referral system

Conclusion

As this paper illustrates, Centers of Excellence can be a highly effective way to deliver better cancer care to more people. Such centers offer benefits to providers as well as to patients and their families. Combining services and integrating expertise in general is a trend throughout the healthcare industry. The advantages are clear: opportunities for greater administrative efficiency, a more comprehensive service offered to patients, smoother internal processes, a more seamless alignment amongst various specialists and departments, and greater economies of scale. Differentiation in a competitive healthcare market can also be an important benefit.

Integrated multi-disciplinary centers can be particularly effective for oncology, largely because of the unique challenges posed by cancer, including the many types of the disease and its complexity. A Cancer Center of Excellence that brings together the right leadership structure and the right team, supported by the right equipment and digital tools, assembled to offer the right combination of expertise, can be a highly effective way to offer the care patients demand.

Digitalization is the essential element that makes it possible to seamlessly integrate a wide array of different services in one location, and many digital tools are available to support such an effort. These include digital patient outcome management solutions, remote scanning support, clinical decision-support, telehealth, and electronic referral systems.

The path of integrating a wide range of services may not always be the best way forward. For some types of medical care—indeed for some types of cancer—facilities that offer narrow specialization may be preferable.²⁵ Yet, in the right circumstances, and with a clear understanding of the elements necessary for success, a Cancer Center of Excellence can be an outstanding option for patients, healthcare personnel, and providers.



Suggested follow-up on

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- Insights Series, issue 7:
Do one thing, and do it better than anyone else; a thought leadership paper on how to “Optimize clinical operations.”
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- Insights Series, issue 26:
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Available at: [siemens-healthineers.com/insights/news/digital-maturity-in-the-era-of-patient-consumerism](https://www.siemens-healthineers.com/insights/news/digital-maturity-in-the-era-of-patient-consumerism)
- Insights Series, issue 28:
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Joanne Grau focuses on current trends and thought leadership content for Digitalizing healthcare. Prior to this role, Joanne has had ten years of marketing experience in Siemens Healthineers as marketing director for the diagnostics division based in New York and as Head of Marketing for ASEAN countries based in Singapore. Joanne graduated from UCLA with a degree in Molecular, Cell, and Developmental biology. Before joining Siemens Healthineers, Joanne was a research scientist in Quest Diagnostics (formerly Celera) and has authored multiple publications. Joanne is also currently a faculty member in Union University of California.



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