Transforming oncology care with digital solutions

Establishment of a virtual expert network for molecular tumor boards

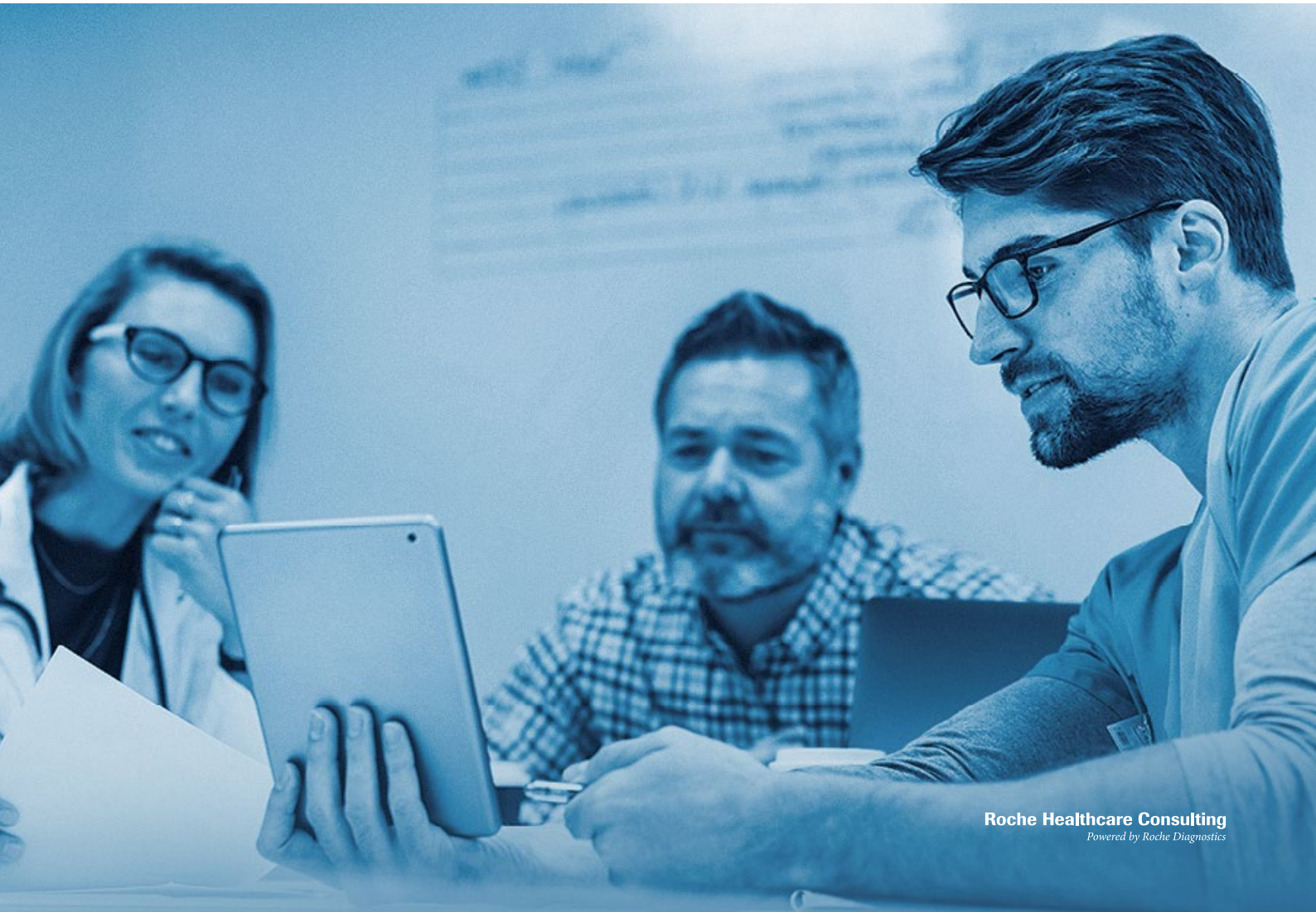

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Table of contents

Foreword

As we are moving towards a digital world, with medical knowledge increasing at an exponential rate,[1] there is a pressing need for the simplification and standardization of hospital processes to enable healthcare professionals to clearly understand and interpret available data. One challenging, yet crucial, process for oncology patient care is the management of tumor board meetings, which involves the handling of large amounts of cancer patient case data and requires the input of multiple specialists to align on the optimal treatment recommendations.[2] With increasing focus on personalized medicine, molecular tumor boards play a pivotal role in the care of cancer patients. These multidisciplinary meetings involve various healthcare professionals (e.g. oncologists, geneticists, pathologists, etc) and their focus on reviewing complex genomic data from individual patients enables the identification of the most appropriate treatment including targeted therapies, immunotherapies, or clinical trials for the patient.[3–5]

Digital clinical decision support solutions, combined with the advice offered from Roche Healthcare Consultants, enable healthcare professionals to simplify their tumor board workflows. Through the partnership of hospital oncology teams with Roche Healthcare Consultants, areas of the molecular tumor board processes that require improvement can be identified, and subsequently the consultants can support the effective implementation and management of new digital ways of working. For oncology departments, this means providing healthcare professionals with the resources required for them to standardize their tumor board workflow, process multiple data sources and make better-informed treatment decisions, which could improve cancer patient care.

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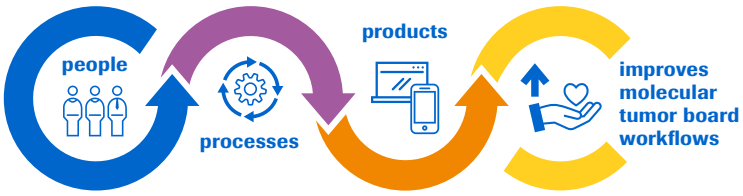
Executive summary

In 2020, healthcare professionals at the Marien Hospital, Wesel, Germany collaborated with Roche Healthcare Consultants to establish a standardized and digitalized molecular tumor board workflow that will enable healthcare professionals to make better-informed, evidence-based oncology care decisions.

Utilizing clinical decision support solutions and Roche Healthcare Consultants' expert analysis of oncology care processes, a Germany-wide network of experts in precision oncology was established and a digital workflow platform for molecular tumor boards was implemented. Since the establishment of this network, multidisciplinary molecular tumor boards have successfully taken place at the Marien Hospital. In these meetings, highly complex patient cases have been discussed by oncology experts from across Germany. Data from multiple sources have been examined, including sequencing results and clinical trial information, which have enabled a comprehensive assessment of each patient. Through the coordination of people, processes, and products, this standardized digital workflow has enabled healthcare professionals to implement effective patient-centered molecular tumor boards and has formed the foundation for future changes in personalized medicine.

Harmonization of



What are molecular tumor boards and why are they needed?

Molecular tumor boards are a specific type of meeting where a multidisciplinary team of experts meet together and review complex genomic results from cancer patients, often with rare or advanced tumors, with the aim of identifying targeted therapies, immunotherapies, or clinical trials for individual patients.[3, 4] In traditional tumor boards, the participants are generally oncologists, surgeons, pathologists, radiologists, and other allied health professionals.[6] Molecular tumor boards, additionally, require clinical geneticists, bioinformaticians, and other biomedical researchers to come together and evaluate not only clinical, radiographic, and pathological results, but also molecular sequencing data, including tumor germline and somatic abnormalities, to select the most appropriate treatment option.[3–6] With advances in next-generation sequencing (NGS) and an increasing number of available cancer treatment options, the field of oncology is becoming ever more focused on precision medicine, leading to a rise in molecular tumor boards.[3, 4]

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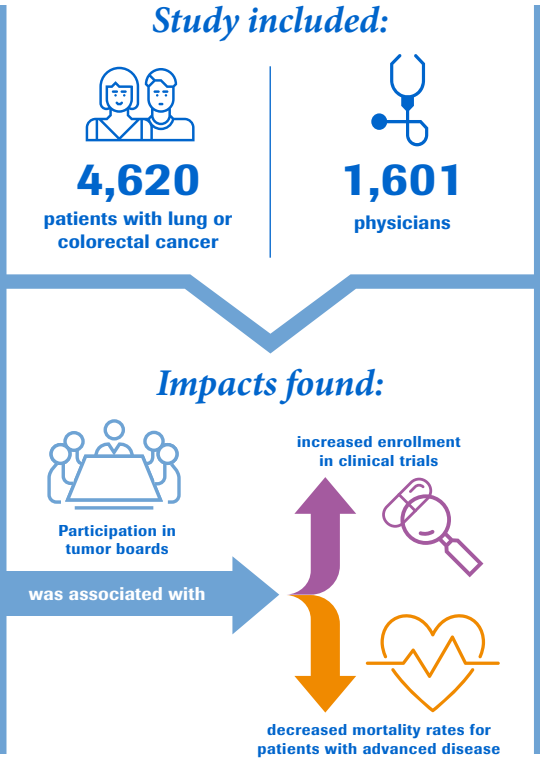
The importance of participating in tumor boards has been highlighted in the Cancer Care Outcomes Research and Surveillance Consortium (CanCORS) study, which involved a cohort of 4,620 patients with lung or colorectal cancer, and 1,601 physicians.[7] This study revealed that participation in weekly tumor boards was associated with lower mortality rates for patients with extensive-stage small-cell lung cancer and stage IV colorectal cancer.[7] Additionally, the study revealed a link between tumor board participation and enrollment in clinical trials.[7] Therefore, tumor boards are integral to oncology care decision-making.



What are the challenges when implementing molecular tumor boards?

Managing and preparing for multidisciplinary tumor boards is a complex, time- and labor-intensive process.[2] This requires the efforts of multiple healthcare professionals to compile and systematically document clinically-relevant data from a variety of sources and fragmented IT systems, adding additional administrative burden.[2, 8] Often valuable patient data are isolated in different internal and external IT systems, which are not structured for interoperability.[9] This makes it difficult to process all relevant data into decision support tools and algorithms. Due to this, healthcare professionals often find incomplete patient information which, along with other workflow inefficiencies, can prolong the time needed to discuss the patient's treatment plan and result in decisions that are unclear or never implemented.[2, 6]

Analyzing complex individual genomic data to inform clinical decision-making for molecular tumor boards makes preparation of these meetings even more challenging compared with traditional tumor boards. As a result of this, molecular tumor boards may need up to four times the preparation time compared with traditional tumor boards (Internal Analysis: Momentum: Molecular Tumor Boards, Roche Healthcare Consulting, 2020) (Figure 1).

Molecular tumor boards may need up to four times the preparation time compared with traditional tumor boards

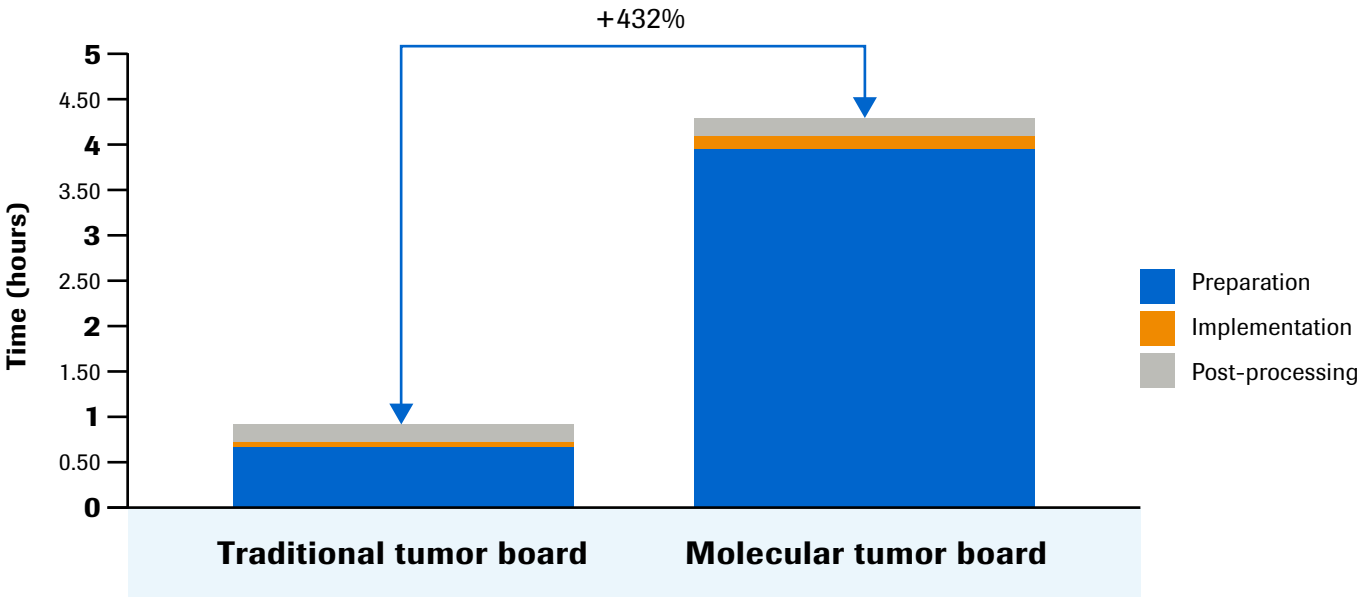


Figure 1. Time invested (in hours) per patient for the preparation, implementation, and post-processing of traditional tumor boards and molecular tumor boards.

A survey among hospitals and research institutions in the Netherlands revealed that most molecular tumor board meetings discuss fewer than five patients (56%) and most occur fortnightly (56%).[5] The common challenges associated with conducting molecular tumor boards include inadequate reporting systems and facilities, unclear information regarding available clinical trials, and limited access to treatments (Figure 2).[5]

Healthcare providers are also under enormous pressure to improve outcomes and reduce costs.[10, 11] Additionally, they face the challenge of going through complicated processes to get access to reimbursement for treatments, which can result in a longer time from diagnosis to treatment for patients, and recent data clearly demonstrate that delays to treatment for cancer patients are associated with increased mortality.[12]

Currently, there are no standards or guidelines for molecular tumor board processes[5, 13] and no standardized way of testing patients or presenting their data. This is made more challenging for clinicians given the exponential growth in medical knowledge,[1] including the rapidly-developing field of molecular markers, and the increased time needed to stay up to date. Due to the vast amount of genomic patient data for molecular tumor boards, it is unsurprising that heterogeneity in the interpretation of data and treatment recommendations exists.[13] An external survey of physicians, including oncologists, revealed variations in how molecular tumor boards are conducted; differences were observed in the number of patients discussed, as well as the duration and the frequency of molecular tumor boards (Internal unpublished data, Roche Healthcare Consulting, 2020).

These challenges highlight the urgent need for a uniform framework for molecular tumor boards, with easily accessible genomic information and therapy options for specific aberrations, as well as clinical decision support solutions.[14–17] The framework should provide clear infrastructural and organizational requirements that are consistent across cancer centers.[18]

What are the challenges that molecular tumor boards face?

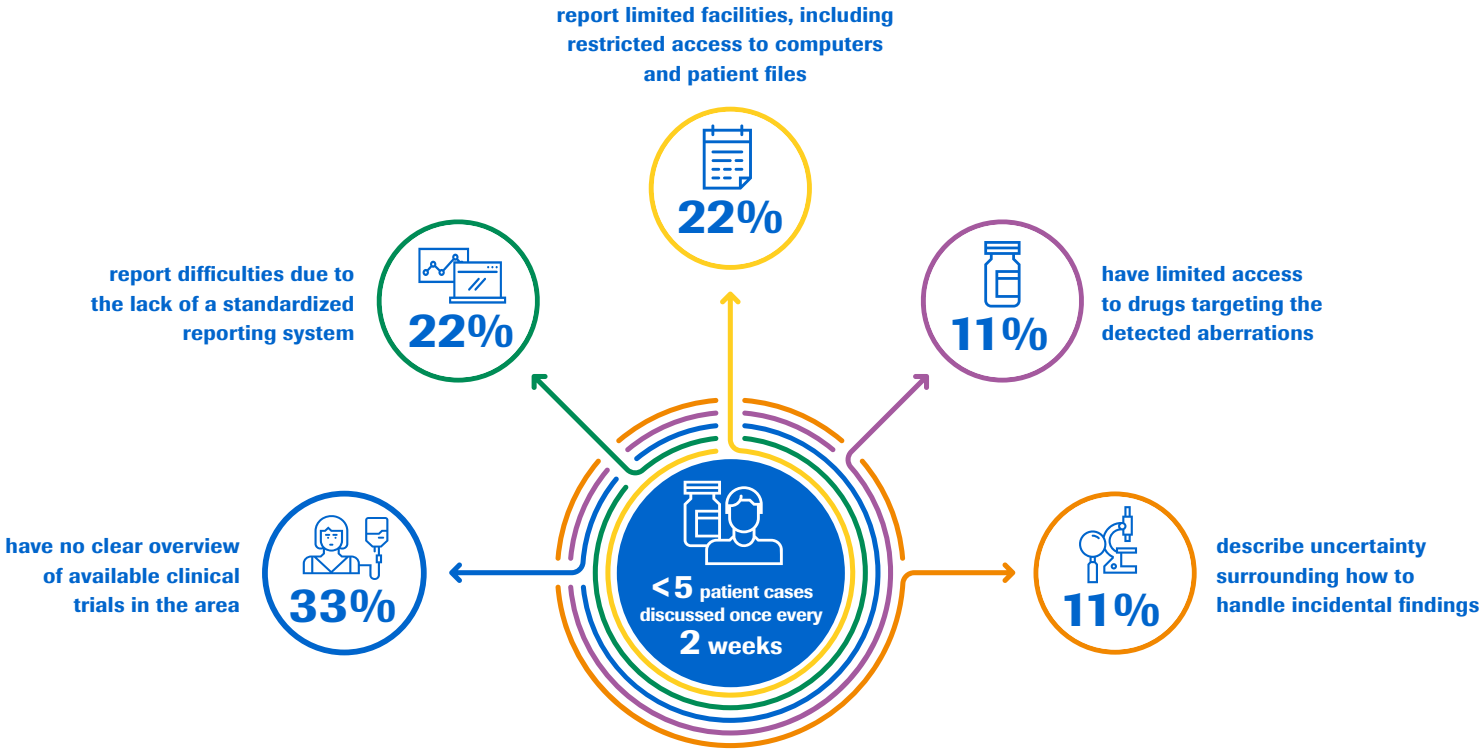


Figure 2. Challenges of molecular tumor board workflows. Findings from van der Velden et al., 2017.[5]

What it takes to be successful in the implementation of molecular tumor boards

Digital tools such as emerging clinical decision support technologies offer a way to improve the efficiency of molecular tumor boards.[2, 19, 20] In addition to streamlining workflows, digital solutions can reduce costs, support clinicians to make informed decisions, and ultimately improve the quality of care.[21–23] Additional support from digital transformation consultants, including Roche Healthcare Consultants, can help to identify the key factors that need changing and support healthcare professionals during and after the transition to a digitally focused way of working. Previously, Roche Healthcare Consultants have collaborated with hospital teams across Europe and Latin America and used their digital expertise, alongside a cloud-based tumor board decision support portfolio, to support the digital transformation of tumor boards. Outcomes of these partnerships have included the streamlining of the steps involved in tumor board management and an increase in the number of cases discussed and participants involved per tumor board (unpublished data from Roche Healthcare Consulting).

There are several steps involved in the digital transformation of tumor boards, depending on the specific needs of healthcare professionals. To begin with, Roche Healthcare Consultants partner with healthcare professionals to determine which aspects of their tumor board workflow and digital roadmap should be assessed. This is tailored to the individual hospital's requirements to ensure the best approach is decided upon. The parameters that are assessed can include costs, quality (picture archiving and communication system/electronic medical records availability, completeness of patient information, postponed decisions), time (preparation, meeting discussion, follow-up), and employee satisfaction (Figure 3).

'Your analysis will be the asset for our future changes'

– Chief Physician in Oncology

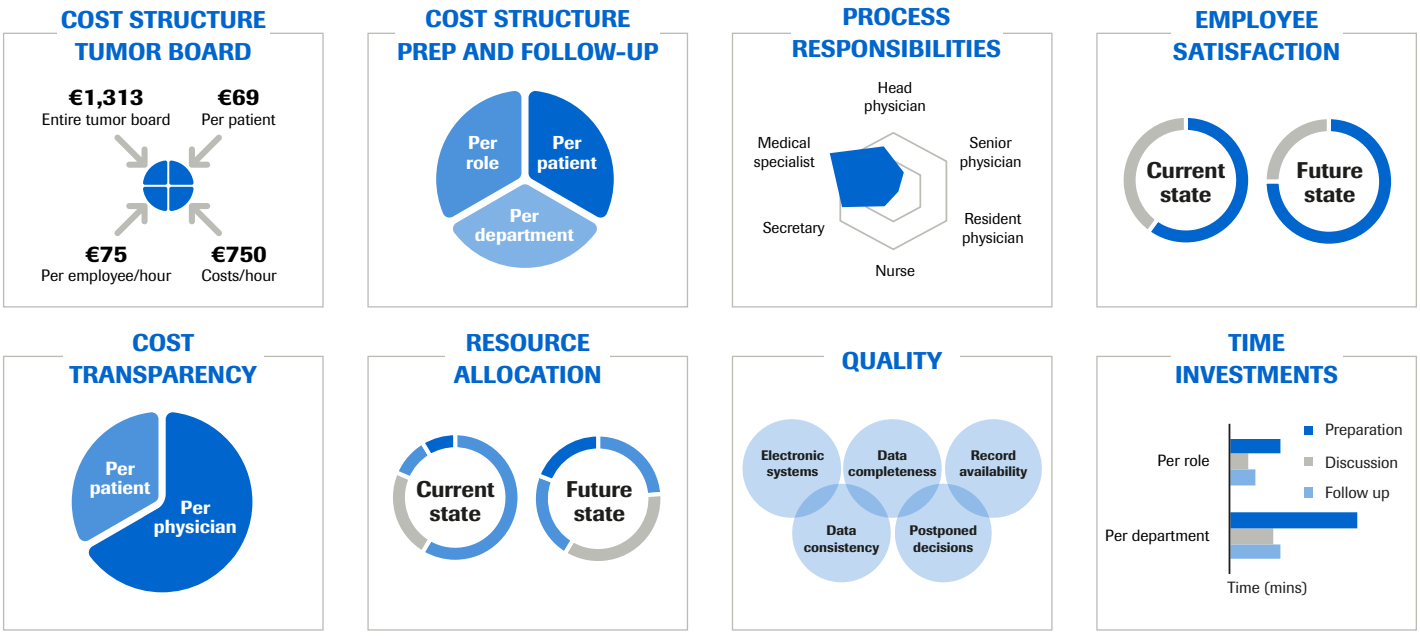


Figure 3. Examples of parameters analyzed by Roche Healthcare Consultants.

From the complex and often fragmented information that is obtained from the evaluation, transparent data-driven insights that reveal key pain points in the preparation, implementation, and post-processing of tumor boards are provided. These insights provide the basis for discussing which areas should be prioritized when it comes to determining future actions.

Next, the consultants and hospital oncology team work together to create a customized approach that can support the implementation of the digital workflow solutions and enhance the benefits of digital tools. This approach gives healthcare professionals the resources they need to effectively utilize the digital solutions that will provide them with extracted and standardized data content from multiple internal and external systems. Additionally, this digitalized and streamlined workflow enables the healthcare professionals to advance their tumor board processes and make improvements to areas such as operational efficiency, decision-making, time from diagnosis to treatment, and staff satisfaction (Figure 4).

For molecular tumor boards, other benefits of a clinical decision support digital solution include supporting healthcare professionals with mapping the flow of data from different hospital and external IT sources, the interpretation of complex molecular data so that more informed and precise targeted therapy decisions can be made, and the digitalization of comprehensive patient case reviews to automate clinical trial matching.

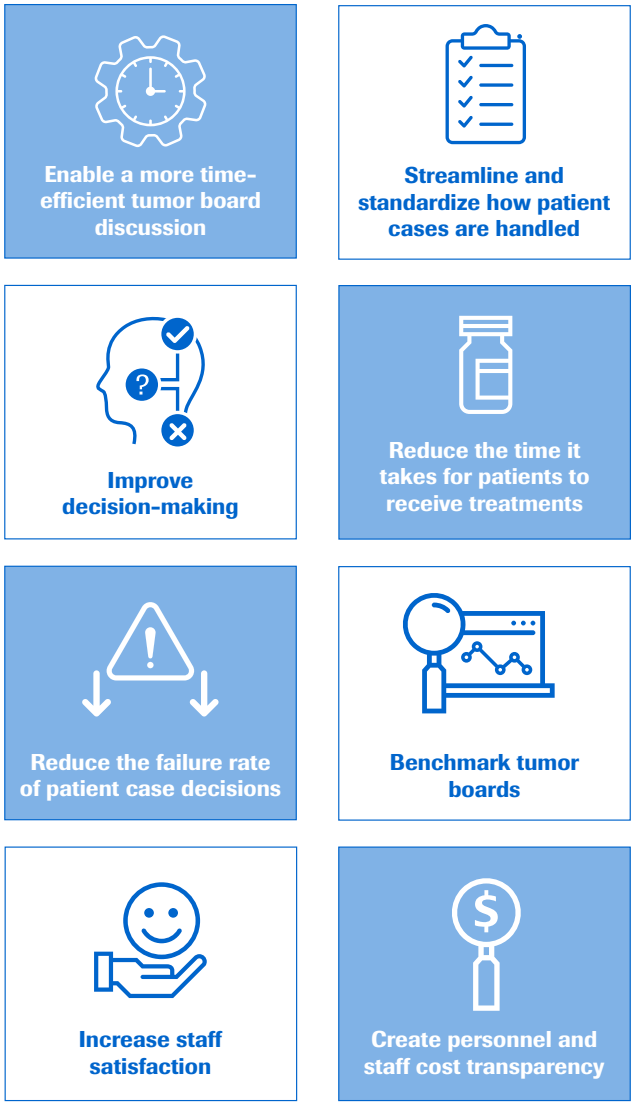


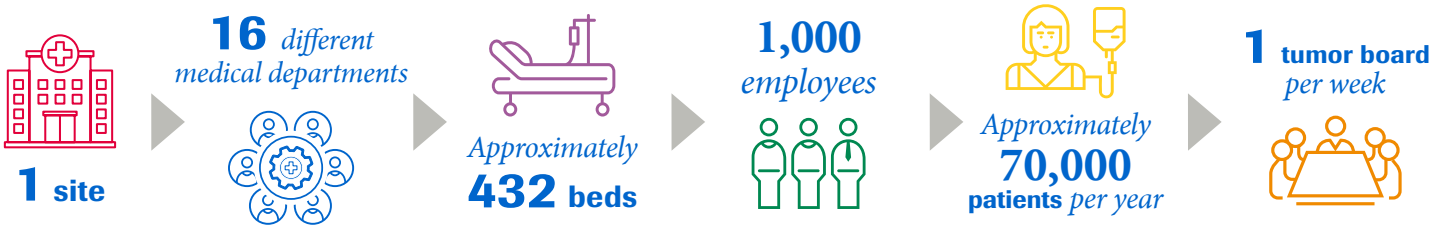
Figure 4. Deliverables and benefits from the collaboration of oncology teams with clinical decision support consultants.

Establishment of a virtual Germany-wide expert network for molecular tumor boards

Project overview, objectives, and approach

The Marien Hospital in Wesel, North Rhine-Westphalia, Germany treats a number of complex oncology patients. The hospital is based at one site, with 16 different medical departments, approximately 432 beds, and 1,000 employees. Every year the hospital treats approximately 20,000 inpatients and 50,000 outpatients.[24] Prior to this project, the hospital was conducting three different types of tumor boards, with one tumor board happening per week.

At the start of this consultation, the Marien Hospital had no molecular tumor boards in place, and a lack of expertise in executing this innovative and complex type of tumor board. Additionally, there was a lack of interoperability of IT systems within the hospital, limiting the ability to exchange information with external partners, as well as a lack of a decision support system to enable insight-driven and evidence-based decisions. Therefore, there was an unmet need for a standardized framework and a decision support system for these multidisciplinary meetings, with reliable processes, minimal sets of data, and clear decision points. This would enable the hospital oncology team to leverage the handling of various complex case data and meet their ambition of holding virtual molecular tumor boards that will help them to offer the best treatment options for their oncology patients.



The Marien Hospital team had an overall goal to develop a virtual network of experts in precision oncology and implement a digital workflow solution, which would enable the running of effective patient-centered molecular tumor boards. Additionally, this would lead to increased regional visibility and hopefully enable other small hospitals to create expert networks. To support them with achieving this goal, the hospital team (consisting of clinicians, IT, and management) partnered with Roche Healthcare Consultants. An initial meeting was held where the teams jointly aligned on five key objectives for this project, which was led by the hospital steering committee.

These objectives were to:

- **Understand the needs and requirements of the healthcare professionals**
- **Identify the incremental value of each stage of the processes that are involved in the patient care pathway**
- **Uncover pain points and develop customized approaches to solve these**
- **Co-create workflow standards**
- **Harmonize people and align on the process and implementation of the cloud-based software solution**

A sequential approach was used to set up the molecular tumor boards (Figure 5). This consisted of an initial 'Kick off' phase to create a common understanding of molecular tumor boards and opportunities for improvement. Next, 'Phase one: status quo' was performed to identify the essential steps in the process and determine the molecular tumor board framework for the preparation, implementation, and post-processing of the meetings. Alignment of the process design occurred in 'Phase two: future state', and the final stage, 'Phase three: piloting', involved fine tuning and trialing of the workflow.

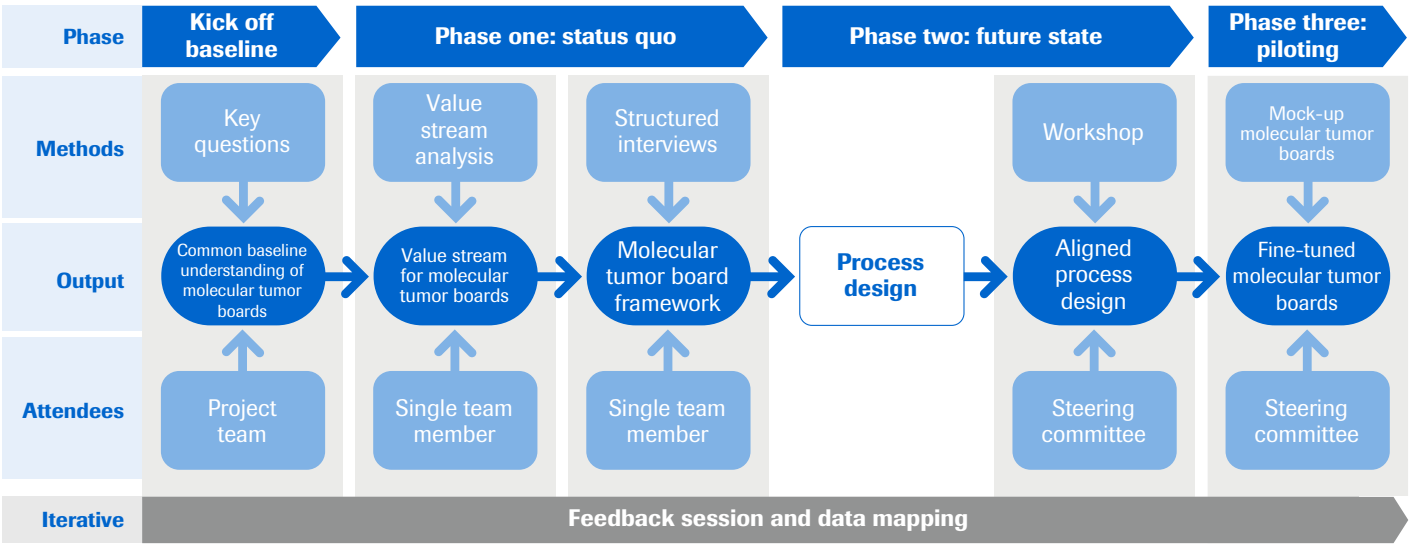


Figure 5. A simplified illustration of the sequential approach for setting up molecular tumor boards. The value stream refers to, firstly, the identification of the relevant process steps involved in the molecular tumor board workflow (including the preparation, implementation, and post-processing) using information about the IT systems, data, resources, costs, responsibilities, etc. Then, secondly, the determination of the incremental value and characterization of each of these process steps.

Impact

The main result from this collaborative approach to develop and standardize the molecular tumor board workflow at the Marien Hospital was the creation of a Germany-wide (across regions) network of experts in precision oncology.

The 'launch' event for the formation of the network occurred in February 2020 with 37 participants, followed by the virtual network going live in June 2020, which consists of 10 partners and seven clinical oncology experts from six institutions. The first molecular tumor board was held in August 2020.

Germany-wide network of experts in precision oncology

Additional outcomes from establishing molecular tumor boards at the Marien Hospital included:

1) The design of entire end-to-end workflows, which synchronize processes and systems, and co-align healthcare professionals

2) The evaluation of cost structures and increased tumor board quality by conducting best practice sessions with participants

Following establishment of the expert network and streamlined workflow, molecular tumor boards have been held which have resulted in:

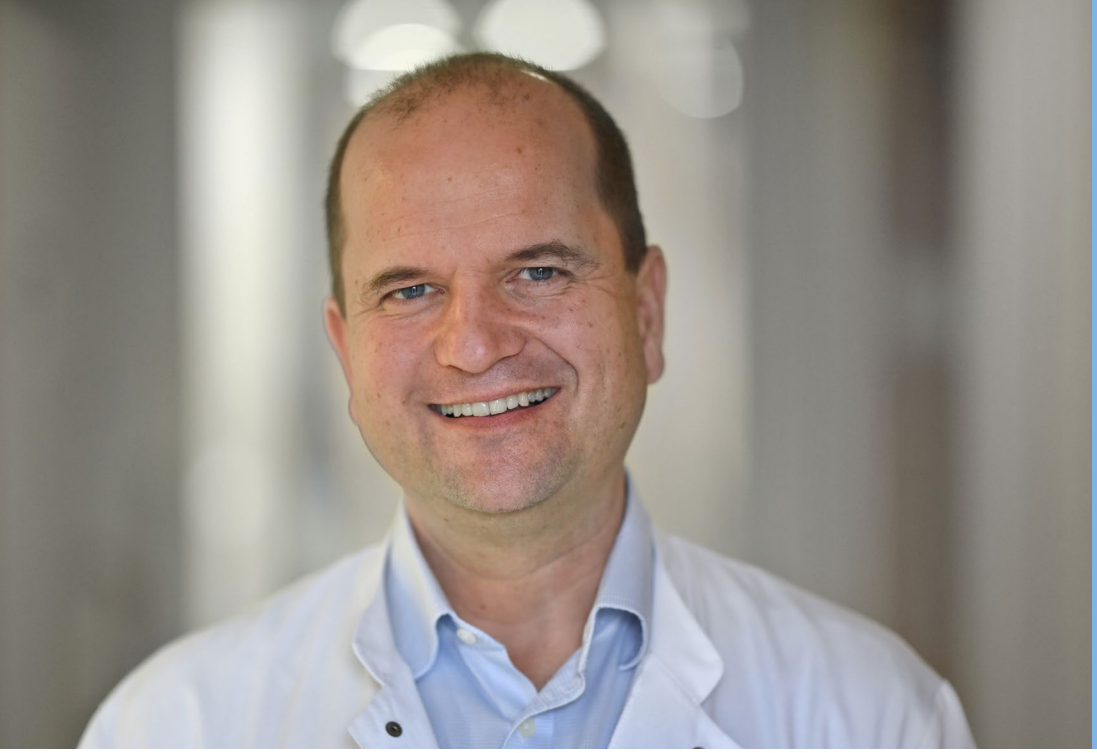
High resource investments (approximately €600 head count investments) **per molecular tumor board**

Very complex patient cases; 14 minutes' discussion time on average

Enables a comprehensive and holistic view of relevant patient information (including CT scans, clinical trials, experimental trials, biomarkers, whole-genome sequencing results)

Germany-wide top specialists for specific entities are participating virtually for relevant cases to support the core network team with their expertise

The new process enables asynchronous patient review to ensure that cases are ready for discussion and decision – this avoids delays to review and treatment



Professor Henning Schulze-Bergkamen,

Chief Physician and Director of the Lower Rhine Centre for Tumor Diseases, Marien Hospital

Chief Physician's testimonial and future vision for the network

Through intensive support in the implementation of a digital platform and the professional analysis and establishment of the entire workflow, we have built up a supra-regional network of experts that considerably supports the implementation of precision oncology in the different regions. These changes build the core asset for our future in personalized medicine.

The molecular tumor board expert network at the Lower Rhine Centre, Marien Hospital is planning further important steps to implement personalized cancer medicine at other sites. The goal of offering innovative therapeutic strategies in the treatment pathway will lead to even stronger support for clinical trials at neighboring centers.

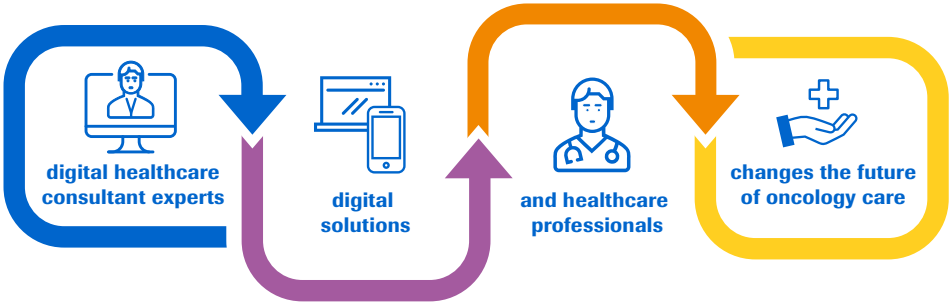
Conclusions

With medical information and treatment options rapidly increasing in the field of precision medicine, digital clinical decision support solutions offer a great opportunity to empower healthcare professionals to improve the efficiency and quality of their oncology care processes.

Through the collaboration between the hospital team at the Marien Hospital in Wesel, Germany and Roche Healthcare Consultants, a Germany-wide network of experts in precision oncology was created, along with a standardized and digitalized molecular tumor board workflow. This expert network and streamlined workflow have already facilitated the implementation of molecular tumor boards at the Marien Hospital. These multidisciplinary meetings have involved Germany-wide oncology specialists who have provided their expertise through virtual discussions of very complex patient cases, supported by data from multiple sources to provide a comprehensive overview of the individual case and relevant treatment options.

From this project it is clear that the successful implementation of standardized molecular tumor board workflows requires a collaboration between digital healthcare consultant experts, high-quality digital solutions, and passionate healthcare professionals who want to make a change to the future of their oncology patients' care.

Collaboration between



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