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**CLINICAL DECISION SUPPORT  
TOOLS IN ONCOLOGY:**

**Making better  
decisions faster**

**The field of oncology is rapidly becoming more complex to navigate. Thus, oncologists are increasingly turning to Clinical Decision Support (CDS) tools for cancer diagnosis and therapeutic decisions. However, the overall adoption rate of CDS tools remains quite low.**

**In this paper, we explore how the current generation of CDS tools is used in clinical practice. How widely are they used? To what extent do they match the requirements of oncologists? How could the user experience and the relevance of the output be improved in future generations of CDS tools? In a diagnostic as well as a therapeutic setting, what will the division of labor between the healthcare practitioner and the CDS tools be?**

**As CDS will soon become an integral part of clinical practice, clarifying those questions for the different players in the wider oncology ecosystem will be paramount to ensure the best uptake and integration of these vital tools in daily practice.**

# What are CDS tools and why do they matter?

## An increase in complexity

Making treatment decisions can be a tough choice for oncologists. While the appropriate therapy might save or significantly extend a patient's life, another therapy might look promising initially but then fail to deliver the desired outcome. Choosing between a multitude of options is becoming a more complex process as the amount of supporting data is steadily growing. On one hand, much **more individual patient data is available now**. With precision oncology on the rise, oncologists will even have more genomic data at hand in the future. On the other hand, recent breakthroughs in drug development have led to a **growing number of treatment options** and more choices to combine therapies.

Given this development, could the escalating amount of available data overwhelm oncologists when identifying the best possible therapy for a patient?

## Make more informed treatment decisions faster

The short answer is a definite yes. With today's standard tools and practices, this will happen soon. However, there is a solution to address the growing intricacy: Clinical Decision Support (CDS) tools. Based on algorithms and extensive computing power, CDS tools are essentially **structuring and filtering medical data** to help physicians make more informed treatment decisions much faster than before.

These tools can support an oncologist at various stages of the pathway. This includes diagnosis, treatment evaluations and long-term disease management. In the diagnostics setting, CDS tools can be used to reduce the risk of human error by "spotting" things even the most experienced oncologists might overlook. To support treatment selection, CDS tools recommend the most effective therapy out of many alternatives as they provide additional insights based on the analysis of large amounts of data. Finally, the tools can monitor the progression of diseases and support to adjust therapies.

However, rates of implementation are still low today—risking unawareness of certain treatment options and/or delayed treatment decisions. According to our previous [research](#), only about one in five oncologists routinely use CDS tools despite the obvious advantages. What is the reason for this?

## Potential of cds tools is not fully utilized today

To gain a more thorough understanding of how CDS tools are currently used in clinical practice, as well as an overview of the challenges physicians face, we conducted a series of qualitative surveys with oncologists at US cancer centers.

One of the main take-aways from our research is that many physicians currently look at CDS tools as **a way to augment their expertise and latest knowledge**, in their respective specialization. Dr. Diana Caragacianu, who is a medical director at the Breast Center at Milford Regional, says: “There’s so much information that we don’t process everything. I believe that there may be the opportunity to be even more accurate and to find details that we may not pay attention to.” CDS tools help oncologists stay up to date. Dr. Joshua Sabari, a lung cancer specialist at NYU Langone’s Perlmutter Cancer Center, points out: “If you’re not reading the literature every day, you’re not going to be able to keep up to speed on that.”

This current application of CDS tools relegates it to simply a large database for research papers and clinical trials, instead of acting as a source of valuable insights. In other words, oncologists who use CDS tools mainly do so to have **easier access to academic publications and filter information from these sources** based on their needs.

Additionally, oncologists told us that many **one-size-fits-all CDS tools currently on the market neither reduce complexity nor save time** for the treating physician. Instead, they have the opposite effect; they require physicians to filter much more information themselves as they need to carefully consider which click is important and which is not. The more the physician has a role in generating the right information himself, the less likely he is to use such a tool. However, as genomic information becomes more broadly available and “smart” features allow for better data flow, the use of CDS tools will rise dramatically.

## Precision oncology will boost use of CDS tools

Precision oncology is one of the main drivers for CDS tools. With high-quality next-generation sequencing technologies becoming more accessible at continuously lower costs, it is more accessible than ever before to analyze the genomic variants of cancers and choose a personalized therapeutic approach. The oncologists we surveyed highlighted the fact that **the data available to them through genomic sequencing will allow them to develop a much better understanding of the individual patient** and his medical needs. Additionally, patient-reported outcome will be increasingly used when making or reviewing therapeutic decisions.

These two developments—more genomic data and more patient feedback—will result in a whole new level of complexity. It is vital to understand that **more data does not necessarily translate into better insights** if the proper tools are not available or are not being implemented. Therefore, in the future, oncologists who are overwhelmed by the data will be turning to CDS tools as a key source to “make sense” of the data.

Dr. Nisha Unni, an assistant professor who specializes in breast cancer at UT Southwestern Medical Center, confirms this interpretation. She argues that as treatment options are “going to get more granular and more detailed, it’s good to have a lot of treatment support.” And in order to use nonstandard treatments with more confidence or interpret clinical trials for a particular sub-population, CDS tools will have to be used much more broadly. However, many of today’s CDS tools are not fit for purpose to be used in clinical practice.

# The evolution of CDS tools

Our research shows that oncologists are looking at **two main areas for improvements in the next generation of CDS tools** that are essential to increasing the adoption of these tools in the future:



## **MORE TAILORED: UNDERSTAND THE CONTEXT**

In our study, physicians frequently mentioned that CDS tools **need to give precise and very targeted information—but at the right moment!** Presently, physicians feel that too much useless data is being thrown at them; the current generation of CDS tools lacks a comprehensive grasp of the context in which decisions need to be made by professionals. Dr. Sabari provides one example of how poorly designed tools could lead to alert fatigue: “If you have a patient who’s a smoker, I get a pop up that says Did you screen them for lung cancer? I’m a lung cancer doctor. All my patients have lung cancer.”

The real challenge of common one-size-fits-all CDS tools is that a poorly designed user journey not only ruins the experience for physicians, but it is also time-consuming. The CDS tools will simply ask too many questions or require too much effort to create a competent user experience. Because of this, the tool is often seen as an annoying obstacle and yet another time-consuming digital resource rather than a value-adding instrument that improves clinical decision-making.

Thus, future CDS tools will have to be more precise, more tailored to the specific context to avoid frustration of the oncologists when having to invest time into non-value adding interactions with the tool.



## **MORE INTEGRATED: BECOME PART OF ROUTINE WORKFLOWS**

Another key concept to focus on when developing the second generation of CDS tools is to **integrate them as much as possible into the physician’s existing routines and tools.** “I think the best CDS tools are the ones that actually bypass the physician. It’s the ones that are just happening in the background without your knowledge. The ones that depend too much on the physician are not ever going to really take off,” Dr. Sabari points out.

If the CDS tool is just another click for the physician or, even worse, another window on the screen, the CDS will not be used regularly. Therefore, integrating the CDS in the electronic medical record (EMR) will allow oncologists to focus on a single solution instead of having to work with many different digital tools at once. Many healthcare providers are considering this direction.

# How oncologists see their future role

Will machines, most of them AI-driven, take over decision-making from physicians as they absorb more data and become “smarter”? The experts we have interviewed for this paper all had a very clear understanding of how labour division between physicians and machines will change. **With improved algorithms and more data available, they agree that CDS will become even more relevant** to them in the future. However, they see large differences in how CDS tools will be implemented in diagnostics as opposed to making therapy decisions.



## DIAGNOSTICS: CDS WILL PLAY THE DOMINANT ROLE IN DECISION-MAKING

Many oncologists believe that CDS tools will become the standard application for diagnostics in the future. Even though the most experienced oncologist may have 99 percent diagnosing accuracy, the technology behind these tools is more likely to create 100 percent precision. Thus, it is obvious that **CDS will play an essential role in pinpointing the exact nature of the disease and the stage of cancer very shortly.** Physicians might not bother with the results of the diagnostics via CDS; they will simply sign them off as they increasingly build trust in the accuracy of these findings.



## TREATMENT DECISIONS: “JUST ANOTHER MEMBER IN THE TUMOR BOARD”

CDS tools will usually recommend the most effective therapy. However, this may not always be the most optimal treatment for the patient if other factors are considered. Quality of life, for example, is a dimension that is hardly cogitated by algorithms. It is undoubtedly a critical aspect for patients who are going through cancer therapy. Therefore, the **oncologist will always remain key in the decision-making process when determining** the opposite approach in an individual situation.

Although treatment decisions will be increasingly based on the options suggested by the CDS tool, the tools will mainly propose options rather than decisions. They will provide a thorough analysis of the available data and **allow the specialist to make a more informed decision supported by “hard” facts.** Dr. Caragacianu points out that “these recommendations solicit our thoughts and I feel like we can be better doctors and can deliver better, more precise care.” And Dr. Sabari adds: “The CDS is just another member at the table in the tumor board.”

# Smother and smarter – the future of CDS tools

In the future, CDS tools will improve both, the efficiency and the effectiveness of oncologists' work and allow them to focus on patient interaction and prioritization of individuals' needs. However, the current generation of CDS tools still has some disadvantages; they are largely descriptive, require a lot of input from the physician and are often not well integrated into the daily routine. To increase implementation rates, the **next-generation tools must focus on becoming more targeted and more easily integrated into the workflows of an oncologist.**

The most important game-changer will be developing **smarter algorithms** to provide the physicians with insights they could not derive on their own. The journey ahead is long; but with recent developments in AI, we are convinced that we will soon see significant improvements in the way CDS tools guide both diagnostics and clinical decision-making. This will not only make the work of oncologists easier, but it will also have an enormously **positive impact on the patient outcome** and the overall healthcare ecosystem.

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