Supporting Decisions or Decision Support? Challenges of Achieving Meaningful Clinical Decision Support in the Modern Era of the Electronic Health Record

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Meaningful clinical decision support (CDS) is the yet to be fully realized ideal of the modern electronic health record (EHR). The electronic collection of patient information as specific data elements carries the tantalizing possibility to use these data in support of real-time clinical decisions for patients. The Agency for Healthcare Research and Quality has identified these efforts as a priority in health care, declaring support to "develop, adopt, implement and evaluate the use of clinical decision support to improve healthcare decision-making" and funding several research initiatives centered on these tools. Researchers have developed several CDS tools, characterized by traditional alert and reminder mechanisms, information retrieval tools and risk calculators, and development of structured order sets for specific clinical scenarios. Evaluation of these decision support approaches has demonstrated incremental success in improving process measures, but data are limited, demonstrating quantifiable clinical benefit.[1]

Although today's EHR provides nearly limitless potential of such tools to improve patient care, there is similarly no limit to the number of tools that can be deployed. As such, clinicians are more wary of their ubiquity and the potential unintended consequences of such proliferation, like cognitive overload and desensitization. Underscoring these concerns are data suggesting that >50% of generated alerts go ignored by clinicians.[2] Thus, although there are ample examples of CDS in today's EHR, are they truly meaningful?

In this issue of the *Journal of the American Heart Association* (*JAHA*), Ebinger et al explore the effects and outcomes of implementing a voluntary CDS alert to assess bleeding risk before percutaneous coronary intervention (PCI).[3] Any order for cardiac catheterization activated the CDS and prompted the ordering provider to use the tool's bleeding risk calculator. Should the provider choose to use the calculator, the CDS would provide a patient's bleeding risk (low, intermediate, or high) and offer suggestions for the use of evidence-based bleeding avoidance strategies in moderate- or high-risk patients. The authors compared use of bleeding avoidance strategies and bleeding events both before and after the implementation of the CDS alert and by use of the alert over the study period.

The authors should be congratulated on engaging multiple stakeholders in the development, deployment, and maintenance of the CDS tool. They demonstrated feasibility of implementing a CDS tool embedded in the EHR. Providers used the tool before nearly half of all PCIs during the study period (44%). Although this is a relatively modest adoption rate, it is consistent with prior analyses of decision support implementation in general.[1] Despite this modest adoption, operators did increase the use of bleeding avoidance strategies after tool implementation. Interestingly, this increase occurred across all PCIs, irrespective of whether the tool was used, suggesting that perhaps the implementation had some generalizable impact on provider behavior beyond clinical reminders for individual patients. Unfortunately, implementation of the tool did not result in any reduction in risk-adjusted bleeding events. The authors suggest several valid reasons that their implementation was not associated with improved clinical outcomes, including effect size and the sheer randomness of the adverse events this CDS tool is aiming to avoid. Taken together, these findings mirror those of prior analyses searching for a link between CDS implementation and outcomes. Although process measures may have significant value on their own, the ideal CDS tool should impact these measures and make a

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demonstrable impact on clinical end points. Unfortunately, most CDS tools that have been evaluated to date may influence clinician behavior, but they have not made an impact on clinical outcomes.

Of course, there is another potential explanation for the consistent inability for CDS tools to affect clinical outcomes: we are choosing the wrong decisions to support. In the present example, this CDS tool was intended to augment the use of bleeding avoidance strategies in patients at high risk for bleeding after PCI. First, when the CDS tool was used, it was preferentially used in patients with lower-risk bleeding or those patients who would not prompt a clinical reminder to the ordering physicians. In other words, it was preferentially avoided in those patients in whom a change in behavior may have had the highest chance of a clinically meaningful result. Second, as the authors state, use of these strategies is only modestly effective in reducing bleeding risk, with 70% of variability in post-PCI bleeding unaccounted for after controlling for use of these strategies.[4] Finally, although the interventional community's increased awareness of the perils of bleeding after PCI likely influenced the creation of this CDS tool, it has also resulted in widespread education and increased national uptake of the same bleeding avoidance strategies championed by the tool.[5] This is demonstrated in the investigators' study population, in whom 99.7% of PCIs performed before the CDS tool implementation used at least one bleeding avoidance strategy. Thus, it should not be surprising that although a modest change in behavior was noted, it was not large enough to overcome the small effect size of the behavior and the background change in behavior that had already occurred. The decision supported by the tool is one that many practitioners had already made: bleeding is bad, and steps should be taken to avoid its occurrence when possible. This is not so much "decision support" as support of a decision already made, affirming and reinforcing already occurring practices.

CDS might better serve the healthcare community if it were aimed at practices with low adoption rates but compelling clinical data. These support tools would offer clinically meaningful benefit, augmenting evidence-based practices that remain poorly adopted. An example is the use of novel antihyperglycemic agents in patients with concomitant type 2 diabetes mellitus and atherosclerotic cardiovascular disease. Although professional societal guidelines have recently recommend their use based on several positive randomized clinical trials demonstrating their benefit,[6] the use of these novel antihyperglycemic drugs remains significantly low among eligible patients.[7] One could envision a multitude of roles for EHR-embedded CDS to augment the use of these evidence-supported agents, from identifying eligible patients through the use of billing and diagnoses codes to assisting clinicians in overcoming barriers to their appropriate prescription, perhaps by automating evaluations of known contraindications to the agents' use or determining prescription coverage to identify cost to the patient. Targeting an intervention with a clinically meaningful impact on outcomes, with a relatively low background use, might achieve the goal of linking CDS tools with clinical outcomes. Another opportunity for clinically meaningful decision support could be in scenarios where ongoing clinical equipoise can challenge decision making. In cases where the risks of harm is much more balanced with the potential benefits of a specific therapy, CDS tools may play a role in helping both clinicians and patients understand risks of specific treatment options. For example, in patients with atrial fibrillation at both high bleeding and thromboembolic risk, CDS tools could play a role in helping clinicians and patients understand the risks and benefits of oral anticoagulation versus an invasive procedure, like left atrial appendage occlusion. Targeting decisions with clinical equipoise may not yield differences in clinical outcomes but may augment the decision-making process for both clinicians and patients alike. In both examples, CDS tools might offer a meaningful enhancement to decision making, rather than affirming already existing practices.

In summary, CDS continues to offer significant promise in the era of the EHR. However, we have yet to harness the true potential of the EHR. Developing CDS tools to remind practitioners about quality metrics that already demonstrate high adherence is unlikely to move the proverbial needle and increases the risk of desensitization. Such tools simply support decisions that clinicians have already made. Meaningful CDS means supporting the decisions that clinicians have yet to make and the CDS can help clinicians make the best decisions for their patients.

Disclosures

None.

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