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# Improving Clinical Quality Indicators Through Electronic Health Records: It Takes More Than Just a Reminder

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State-of-the-art electronic health record systems with advanced clinical decision support (CDS) capabilities can fundamentally improve quality and reduce costs of health care.[1,2] However, these outcomes have not been universally achieved.[3,4] As the study by Fiks et al[5] in this issue of *Pediatrics* demonstrates, providing CDS in the form of "alerts" to encourage desired health care activities may not be sufficient to make a substantial impact.[6] Maximizing the potential of CDS for improving quality and safety of care requires attention to several factors, not all of which are related to the computer system.[7]

The goal for the study by Fiks et al was to increase vaccination rates in asthmatic children, so in examining the results one must first consider what caused the low vaccination rate in their population. Several factors could account for the low initial vaccination rates and, hence, could explain the minimal improvements with alerting. Without knowledge about these factors, it may be too much to expect alerts alone to fix the problem. Alerts are helpful when an unusual occurrence must come to a physician's attention or when a necessary process might be overlooked in a busy encounter. When other underlying problems lead to low vaccination rates, such as poor patient acceptance, difference of opinion about vaccinating patients late in the season, or low priority of vaccination when a patient has an acute problem, they must be addressed before the alert can be successful. Indeed, studies of influenza vaccination reminders in adults have had varying results, and in some cases these results were directly attributable to such noncomputable factors.[8,9] It would have been enlightening if the decision support used in this study also captured the reasons for failure of the providers to act on the alert by having them select or enter a reason for nonvaccination.[10]

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In addition, one should also consider whether presentation of the vaccination alert as soon as the patient encounter was opened within the electronic health record was the best CDS intervention to achieve the desired objectives, compared with other intervention types such as facesheet displays, order sets, patient education handouts, and end-of-visit forms. In a guide to CDS implementation that we published in 2005,[11] we suggested that different types of CDS presentation, applied at different parts of the visit workflow, can have very different effects depending on what it is that one is trying to encourage the physician to do. Moreover, communication through group academic detailing(used in this study) may not be the best strategy to educate and change the behavior of clinicians regarding the concepts behind clinical alerts.[12,13]

To achieve a specific clinical objective by using a CDS intervention, one must consider whether the communication and acceptance groundwork has been laid to maximize the intervention's impact, and also consider what type of CDS, applied when in the encounter, is likely to have the greatest impact.[14] From the aforementioned CDS guidebooks[11,14] and other published reviews of CDS effectiveness factors,[15,16] we support the following list of questions to consider before the implementation of any real-time, point-of-care CDS intervention designed to interrupt clinicians during their work.

Communication and acceptance:

1. Has the clinical rule or concept that will be promoted by the intervention been well communicated to the medical staff in advance?

2. Does the intervention, if accepted, change the overall plan of care, or is it intended to cause a limited, corrective action (such as preventing an allergic reaction to a drug)?

3. Are the data used to trigger the alert likely to be accurate and reliable, and are they a reliable indicator for the condition you are trying to change?

4. What is the likelihood that the person receiving the alert will actually change his or her patient management as a result of the alert?

5. Is the patient likely to agree that the recommended actions are beneficial?

Intervention technique:

6. Is an alert the right type of intervention for the clinical objective, and is it presented at the right time?

7. Is the intervention presented to the right person?

8. Is the alert presented clearly, and with enough supporting information, so that the clinician feels confident in taking the recommended action immediately?

9. Does the intervention slow down the workflow?

10. Is the overall alert burden excessive ("alert fatigue")? Were the study providers receiving other types of alerts at the same time?

11. Is the clinical information system, including the use of CDS (eg, the alerts), well-liked and supported by clinicians in general?

Monitoring:

12. Is there a way to monitor the response to the alert on an ongoing basis?

Real-time, point-of-care CDS interventions can be highly effective if the right intervention for the desired clinical objective is used, if the recommendation has been accepted clinically by the physician and patient, if the alert is accurate and clearly understood, if it is presented

at a point in the encounter at which the physician can confidently take action on it, and if it makes it easy for the physician to take such action without prolonging or confusing the workflow.

Improving clinical quality objectives through CDS, such as increasing influenza vaccination rates, can be substantially improved by using a systems perspective to address aspects of communication, medical acceptance, clinical workflow, choice of computerized display, and ongoing monitoring. Taken together such extensive interventions can lead to better health outcomes for our patients.

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