Impact of Alert Specifications on Clinician Adherence: a Systematic Review

Reza Khajouei[a,b,c], Linda W. Peute[a,c], Maurice M. Langemeijer[a], Monique W. Jaspers[a]

[a] *Department of Medical Informatics, Academic Medical Center – University of Amsterdam, The Netherlands*
[b] *Kerman University of Medical Sciences, Kerman, Iran*
[c] *The first two authors equally contributed to this paper*

Abstract and Objective

More than half of the alerts integrated into health care information systems are overridden by clinicians. A systematic review on studies evaluating alert specifications, such as alert type, design and message content, and their impact on clinicians' alert adherence was done. Use of colors and icons in alerts of varying severity and the presentation of alerts in an interruptive fashion based on their severity increased clinicians' adherence. Lack of clinical importance and correctness of alert information resulted in alert non-adherence. The amount of evidence generated on the impact of alert specifications on clinicians' alert adherence is limited. However, this review shows that a relation is apparent between alert specifications and clinicians' alert adherence.

Keywords:

User-computer interface, Hospital information systems, Alert, Reminder systems, Clinicians adherence

Introduction

Alerts provide evidence at the point of care and support clinicians in making decisions. However, there are still aspects of alerts that need improvement to fulfill their potential in enhancing evidence-based clinical decision making. Although higher physicians' compliance to clinical guidelines has been reported as a beneficial effect of alert implementation, some studies showed that 49% to 96% of the alerts are still overridden, undermining the purpose of these alerts.

Methods

MEDLINE and EMBASE were systematically searched from January 1, 1990 until January, 1 2009 using a combination of Medical Subject Headings (MeSH terms) and keywords. These terms were grouped as (A) interactive computer systems, (B) alert, warning, reminder, or feedback, (C) alert specifications (e.g. design). All titles and abstracts of these articles were reviewed by one of the authors (ML). Two other authors (RK and LP) each reviewed half of the total set. Studies were rated as relevant if in the abstract the following items were mentioned: 1) the system under study is an interactive health information system, 2) the study is about clinician alert adherence, and 3) the study objective is the evaluation of at least one of the following alert specifications (type, design, or message content). Selected articles were discussed in a meeting and if all three reviewers agreed upon inclusion, full texts were reviewed. A standard data collection form was applied to review the included articles.

Results

From the 735 resulted articles seven were found eligible for inclusion. Five studies were performed in an outpatient setting and two of them in an inpatient setting. Tiering the presentation of alerts based on their severity increased the adherence to alerts more than two times, compared to the situation in which alerts with different severities are presented in the same manner. From the three studies investigating the impact of automated alerts compared to on-demand alerts one study showed that the alerting version significantly improved the physicians' performance and adherence while, others reported no significant difference in physicians' adherence. The use of different colors for differentiating alert severity levels and the use of icons for indicating the domain of notification improved quick adoption of alerts in clinical practice. Three of the studies showed that lack of clinical importance of alerts and incorrectness of drug/disease information counted for more than 40% of physicians' non-adherence to automated alerts.

Conclusion

Our findings suggested that the way that an alert is presented can influence clinicians' adherence to the recommendations provided. Variation in the alert design enhances clinicians' awareness of situations requiring their attention. Improvement in clinicians' adherence to alerts is to be gained by using noticeable warnings, and by facilitating navigation of alerts. Although the review showed an association between studied alert specifications and clinicians' alert adherence, further research will have to show what types, designs and message content of alerts ultimately affect other (clinical) outcomes.