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Short communication

Coded entry versus free-text and alert overrides: What you get depends on how you ask

Hanna M. Seidling[a,b], *Marilyn D. Paterno*[a,c], *Walter E. Haefeli*[b], *David W. Bates*[a,c,*]

[a] *Division of General Medicine and Primary Care, Brigham and Women's Hospital and Harvard Medical School, Boston, MA, USA*
[b] *Department of Clinical Pharmacology and Pharmacoepidemiology, University of Heidelberg, Germany*
[c] *Partners HealthCare System, Wellesley, MA, USA*

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ABSTRACT

Purpose: A key trade-off in computerized clinical documentation exists between collecting coded data versus free-text. Coded data are more readily computer-readable and easier to reuse in different contexts. However, clinical information often exceeds the scope of commonly available terminologies, and coding may be resisted by providers. Alert override reasons are one domain for which agreed-upon terminologies are rarely used. Few data are available on how the collection of information affects the responses of providers.

Methods: We took advantage of a natural experiment and compared coded and uncoded reasons for drug–drug interaction (DDI) alert overrides entered in two inpatient prescribing systems with an identical DDI database but with one system offering coded reasons and the other free-text entry. We only included alerts which were issued in both sites and which physicians had to acknowledge.

Results: Over a one-year study period, 15,636 alerts were issued. The reasons for override entered in the coded approach matched the free-text site in only 46%. When using free-text, physicians provided many reasons not among the coded options, and often reported that they considered the alert inappropriate, including their rationale regarding this. However, the information entered as free-text included many typing and spelling errors, and the same concept was often represented in different ways, e.g. 209 different ways in which "will monitor as recommended" was noted.

Conclusions: The reasons for alert override vary substantially according to the data entry type, which implies that data entry choice may lead to substantial distortion of the underlying data.

1. Introduction

In healthcare-related documentation, the increasing amount of clinical data combined with the need to reuse and exchange information underscores the importance of how data are collected. Large parts of clinical workflow, including diagnosis, drug treatment, and patient monitoring have been successfully transferred from paper-based to computerized documentation [1]. Apart from the potential for saving time [2], computerized documentation facilitates standardization

* *Corresponding author at*: Division of General Medicine, Department of Medicine, Brigham and Women's Hospital, Brigham Circle, 1620 Tremont St., Boston, MA 02115, USA. Tel.: +1 617 732 5650; fax: +1 617 732 7072.
E-mail address: dbates@partners.org (D.W. Bates).
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of documentation, which should in turn enhance the data comparability, facilitate its reuse, and potentially improve the capture of key details [3,4]. Standardization can be achieved by inclusion of structured vocabularies which refer to distinct terms or codes as well as prephrased sentences which are accessible via drop-down menus or activation of radio buttons [5].

However, clinical conditions are complex, and good vocabularies do not exist for all domains [6,7]. Thus, computerized systems often allow the (additional) capture of information into free-text fields, which enables collection of a richness of detail not possible with coded entry. However, if not controlled for plausibility, such coexistent use can result in contradicting information [8], and indeed, Singh et al. have documented hazardous discrepancies between coded and free-text entries in a computerized physician order entry platform [9]. Hence, coded entry can be particularly problematic when the fields do not sufficiently cover the domain the user seeks to describe.

In order to assess how information entered by using a coded approach compared to free-text differs when only one data entry format is available, we took advantage of a natural experiment, and assessed the acknowledgement of drug–drug interaction (DDI) alerts in two different inpatient settings, both containing the same DDI alerts but one with coded and one with free-text entry only.

2. Methods

2.1. Description of study sites and data collection

We retrospectively compared the textual information by which physicians acknowledged a DDI alert in two electronic prescription systems. Both systems were implemented and in long-term use for inpatient care in large tertiary care university hospitals. The underlying DDI knowledge base was identical for both systems.

For DDI alerts of major severity, the physician could in response to the alert in both systems either cancel the prescribed drug or keep the prescription and specify a reason. Therefore, following the DDI alert, system A presented the physician five terms of which they could choose one or more by clicking a select box. As sixth option, they could select "other" and specify a reason in a free-text field (Table 1, Fig. 1). System B only offered the possibility to enter free-text. In order to compare the content of the entered information, we retrospectively encoded the free-text entries according to the terms provided in system A. Moreover, we defined eight additional information cluster (Table 2) and allocated the free-text entries to these terms. If allocation was not possible, the free-text was categorized as "other".

2.2. Inclusion and exclusion criteria

We included alerts issued between 02/01/2004 and 02/01/2005 which had to be acknowledged by the physician (either by cancelling the prescribed drug or entering a reason for keeping it) in order to continue with the ordering process and which occurred in both study sites.

Data collection in each study site was approved by the Partners HealthCare System Institutional Review Board.

2.3. Statistical analysis

Results were reported as proportions. All nominal parameters were compared by Chi-square analysis. A p-value < 0.05 was considered significant. All analyses were performed with SAS for Windows, version 9.1 (SAS Institute, Cary, NC).

3. Results

In system A, 6526 DDI alerts were issued, and physicians cancelled the current or discontinued the pre-existing drug in 586 and 812 cases, respectively (in total 21.4%). Thus, the physician prescribed both drugs concurrently in 5128 cases, for each of those selecting one or several prephrased reasons. In system B, physicians cancelled the prescription of the drug triggering the DDI alert or discontinued the previously prescribed drug comparably frequent in 971 and 876 of 9106 DDI alerts (in total 20.3%, $p = 0.087$).

In system A, in case both prescribed drugs were kept, providers selected in 90.5% one distinct reason out of the five terms as acknowledgement of the alert ($n = 4643$); occasionally ($n = 262$), combinations of terms were chosen. In 316 cases the option "other" was selected, and additional information was entered in the free-text field. Those free-text entries could however be retrospectively allocated to one of the terms in 122 cases (e.g. "Other; pt tolerating combination preoperatively" was matched to the term "patient has tolerated combination before"), leaving only 194 acknowledgements classified as "other" (Table 1).

In system B, when both prescribed drugs were kept, providers entered 1387 distinct reasons as free-text entry. Retrospective allocation to one of the five terms was possible only for 46% of the free-text entries ($N = 3751/8135$). However, the free-text summarized as "other" contained several information clusters which we further classified into the following categories:

(1) time-shifted administration (2) route of administration preventing DDI, (3) short-term treatment, (4) indication requires drug, (5) prescription was recommended, (6) aware of the interaction, (7) overriding the alert without reason, and (8) other (Table 2).

4. Discussion

We analyzed a large dataset of drug interaction alert overrides to assess how physicians acknowledge electronic warnings when they were offered coded reasons versus free-text to override an alert. The underlying DDI database was identical and the two systems were implemented in comparable inpatient care settings. While physicians decided to keep both or cancel either one of the interacting drug with comparable frequency, the reasons they used to justify keeping an interacting medication order differed substantially—they agreed just under half the time.

When coded alternatives were offered, physicians picked in >95% one of the predefined terms. Hence, for the large majority