THE EFFECT OF FORMS/CHECKLISTS ON DATA COLLECTION BEHAVIOR

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Abdominal pain (AP) is one of the most common complaints of patients, accounting for about 5% of all cases seen in the Emergency Department. Yet, abdominal pain is frequently evaluated in an irregular and non-standard manner, even within individual institutions. Thus, we developed a form that prompted for AP-specific information and hypothesized that use of such a form would increase the quantity and quality of data collected. All 11 emergency medicine residents at our institution were enrolled as subjects during a single calendar month (January, 2001) and were asked to use the new AP form during the weeks 2 and 3 (weeks 1 and 4 were the control period). Results showed that the use of the AP form significantly increased the recording of information related to: history of present illness, past medical and social history, review of systems, and physical exam. However, guarding and rebound, signs observed during the physical examination, are usually commented on simultaneously, regardless of whether they are present. The design of the structured form included a check box for guarding and not for rebound. Excluding rebounding from the structured form allowed us to test the effect of the form on listed vs. non-listed items. When using the general forms, the physicians commented about both symptoms in 21% cases (25.1% rebound, 23.1% guarding). The structured form showed an increase in the documentation of guarding (a listed item) to 61.6%. However, in only one case did a physician document rebounding (7.1%). This suggests that form designers must be very careful to include all relevant items, and it also suggests a potential flaw with the use of structured forms—e.g., that non-“standard” cases may be more poorly documented with the use of a standard form.

Introduction

The process by which patients in Emergency Departments in the United States are evaluated is irregular and not standardized. Abdominal pain is a common emergency medicine complaint. For example, the University of Virginia (UVA) Hospital Emergency Department sees approximately ten cases per day of patients complaining of abdominal pain (AP), making up about 5% of all patients seen. Currently, the doctors use a generic form for all patients admitted into the Emergency Room. Without a standard set of guidelines for data collection, an examining physician may not know all the information necessary to make diagnostic decisions (particularly in a teaching hospital where residents continuously rotate) or the physician may forget to ask or record all data that are relevant. The diagnosis of abdominal pain is a complicated and resource intensive diagnostic process that would likely benefit from standardization (Adams, Chan, Clifford, Cooke, Dalsó, de Dombal, Edwards, Hancock, Hewitt, McIntyre, Somerville, P., Spiegelhalter, Wellwood, and Wilson, 1986; American College of Emergency Physicians, 1994; Bergman, 1996; Brewer, Golden, Hitch, Rudolf, and Wangenstein, 1976; Cope, 1972; de Dombal, Leaper, Staniland, Horrocks, and McCann, A., 1972; de Dombal, Dalsó, and McAdam, 1992; Lukens, and Emerman, 1993; Paterson-Brown and Vipond, 1990; Powers and Guertler, 1995).

This project aimed to relieve these problems by developing a standardized form for use in AP patient examination. We hypothesized that its use would assure that all AP-relevant patient data would be collected and recorded in the same manner regardless of the examining physician. Furthermore, structured data collection allows for storage and later analysis of this data, beneficial for retrospective analyses and research on patient demographics, symptoms, interventions and outcomes. Current methodology of data collection and recording makes audits on the quality of care very difficult.

Form Design

A structured data collection form for patients complaining of abdominal pain was developed using existing examples from other institutions, medical literature and input from experts at the UVA Health System. The form includes general and gender specific data points (elements of patient history, physical examination, and diagnoses) common to abdominal pain cases that should ideally be recorded for every patient (such as the time course, quality and severity of pain, associated symptoms, what causes the pain to increase or decrease, characteristics of the abdomen (tender, bloated, etc.). Each data point was assigned an a priori weight based on relative importance as judged by the physicians on the investigation team. The weighted data points served as criteria for scoring the quality of patient form documentation.

The form requires filling out 2 sides of one sheet consisting of check boxes, figures, and fill-in areas for recording data. “Guarding” and “rebound”, diagnostic characteristics of the abdomen observed during the physical examination, are usually checked for simultaneously during the physical exam. The design of the structured form included a check box for guarding and not for rebound (see Figure 1).
Excluding rebounding from the structured form allowed us to test the effect of the form on listed vs. non-listed items.

Methods

The clinical experiment took place in the University of Virginia Emergency Department. The experiment restricted the participating physicians to emergency medicine residents to minimize the effect of a learning curve experienced by the non-emergency medicine residents on an emergency medicine rotation. The one-month time period was the maximum time allowable without the threat of inconsistencies associated with the monthly rotation schedules of the emergency medicine residents.

We performed the study from January 3rd to January 30th, 2001. The experiment was comprised of three specific periods. A one-week baseline evaluation period served as the control period from which changes in patient data documentation was compared.

In this phase, the emergency medicine residents used the generic University of Virginia Health System Emergency Room Record as they were accustomed to doing. During the two-week trial period that followed the baseline period, the emergency medicine residents were instructed to use the structured form instead of the generic form for non-traumatic adults (18 years and older) complaining of abdominal pain. The final week, the reevaluation period, marked crossover change in the documentation of the general form as a result of experience with the structured form.

Two teams comprised of two members each scored all of the charts for patients admitted into the Emergency Department complaining of abdominal pain. Both teams graded all of the residents’ charts to ensure accuracy and inter-rater reliability was measured to ensure consistency.

Figure 1. Part of the abdominal-pain-specific form, where only one (guarding) of two commonly associated symptoms (guarding and rebound) are listed.
Results

Out of the 11 residents who participated in the study, 10 saw cases during the study period, and 9 performed at least one examination using the form. In all 9 cases, the average score of the resident increased with use of the form (see Figure 2). Resident 1 saw the most dramatic increase in score, of over 170%. Residents 4 and 9 performed the most examinations using the form, and saw increases of 65% and 43%, respectively.

![Comparisons of Scores](image)

Figure 2 - Average Score by Resident

Table 1 shows the results, comparing all cases documented with the new form vs. all cases documented with the generic form. These results show highly significant improved data collection with the form in the areas of: history of present illness, past medical and social history, review of systems, and physical exam. There was no difference between the forms on documentation of diagnostic studies, as would be expected as these results are typically reported on a different form and not carried over to this type of a form. Finally, there was a significant decrease in the number of patients with recorded secondary complaints with the use of the form, suggesting that it may be difficult to record multiple chief complaints with this type of a form.

<table>
<thead>
<tr>
<th>Table 1. Scores by Form Use</th>
<th>Control (n = 198)</th>
<th>Intervention (n=38)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Adequacy of Data Collection¹</td>
<td>33.4 ± 9.3</td>
<td>49.7 ± 9.7</td>
<td>P&lt; 0.0000</td>
</tr>
<tr>
<td>History of Present Illness¹</td>
<td>12.6 ± 7.2</td>
<td>22.9 ± 5.2</td>
<td>P&lt; 0.0000</td>
</tr>
<tr>
<td>Past Medical and Social History¹</td>
<td>8.6 ± 2.3</td>
<td>10.6 ± 3.3</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td>Review of Systems¹</td>
<td>4.8 ± 3.8</td>
<td>7.7 ± 4.8</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td>Physical Exam¹</td>
<td>20.6 ± 7.6</td>
<td>29.6 ± 6.0</td>
<td>P&lt; 0.0000</td>
</tr>
<tr>
<td>Diagnostic Studies¹</td>
<td>6.0 ± 6.3</td>
<td>6.0 ± 6.7</td>
<td>P = 0.92</td>
</tr>
<tr>
<td>Documentaiton of 2º Complaints²</td>
<td>65%</td>
<td>48%</td>
<td>P = 0.048</td>
</tr>
</tbody>
</table>

¹ Two-tailed t-test for independent samples.
² Chi-square test for independence.

Compliance Rate

Out of 116 total cases seen in weeks 2 and 3 (the testing period), the physicians only utilized the template form 38 times, a 35% compliance rate. There existed a large disparity among the compliance rates of the individual physicians. Some had rates as high as 72.2% (Resident 4), whereas others were as low as 0% (Resident 7). These results can be seen in Figure 3.

![Compliance Rate](image)

Figure 3 - Resident Compliance Rate

We conducted a post-study survey to get subjective opinions of the use of the form, particularly due to the low compliance. Results from our survey showed that the primary reason for not using the form was forgetfulness. A secondary reason was the difficulty of using the form for patients with multiple chief complaints. Thus, the significantly lower number of forms that documented secondary complaints (see Table 1) may be due to a self-selecting factor by the subjects, i.e., they chose not to
use the form with patients complaining of multiple symptoms.

Although there was a low compliance rate amongst the residents using the form, when surveyed, 6 out of 7 of the survey respondents reported “liking” the form (4 out of 5 on a 5-point Likert scale) and the 7th respondent was neutral (3 out of 5). 100% of respondents thought the form was useful and effective in recording standardized and thorough patient data. Six of the seven respondents stated that the form prompted them to ask the patient for more information than they would normally acquire using the current patient evaluation form. One resident commented, “The form especially aided in thorough data collection on cases I thought were straightforward.” Furthermore, all of the respondents believed that standardized data collection was not only aided by our form, but was useful for training purposes and epidemiology studies.

Finally, all of the residents stated that the form became easier to use as they became acquainted with its format and layout. One resident commented, “This form has great potential and could become very valuable in the long run. I don’t want this form to be thrown-out because we are using the results during the “adjustment phase.” Nobody likes to learn new things.” Another resident stated, “Following this initial glance, the resident would need three to five uses to feel completely comfortable using the form during a patient examination.”

Effect of Form on Data Collected

Guarding and rebound, signs observed during the physical examination, are usually commented on simultaneously, regardless of whether they are present. The design of the structured form included a check box for guarding but not for rebound. When using the general forms, the physicians commented about both symptoms in 21% cases (25.1% rebound, 23.1% guarding). The structured form showed an increase in the documentation of guarding (a listed item) to 61.6%. However, in only one case did a physician document rebounding (7.1%). These results can be seen in Figure 4.

This suggests that form designers must be very careful to include all relevant items, and it also suggests a potential flaw with the use of structured forms—e.g., that non-“standard” cases may be more poorly documented with the use of a standard form.

Figure 4 Influence of form on documentation of listed vs. non-listed items

Conclusion

We hypothesized that the use of a standardized AP form would provide for a more complete means of data collection and analysis. After determining what data was crucial to diagnostic decision-making, we designed and created an AP form to test this hypothesis. For a two-week period, Emergency Room residents were asked to use this form as a substitute for the hospital's current generic form when performing examinations on patients complaining of abdominal pain. We collected hospital records on all cases of AP throughout the month of January, and recorded all documentation made by the residents. Our group assigned predetermined scores to certain critical data points, and totaled these to give a score to each case in the study. To determine the effect of the AP form, we then compared the scores based on form use.

When residents utilized the AP form, the average score for those patient encounters was significantly higher (59%, p<.00001) than those using the generic form. More data points were collected per case when the form was used, and thus the form provided for a more complete means of data collection. Unfortunately, the residents only used the forms during 35% of all eligible patient encounters. This low compliance was primarily due to forgetfulness, and a longer test period with training on the use of the form may alleviate this problem in the future. Residents reported liking the form, and felt that it helped with complete documentation, training, and standardization.

The primary concern with the use of such forms is the extent to which they not only positively influence data collection for listed items, but also the extent to which they deter the documentation of items that are not listed on the form. Further study is needed in
this area to determine if there is a way to overcome this potential negative factor.

If these factors can be overcome, based on the significant increase in score demonstrated by this study, we feel a full-scale implementation of a standardized form in the future will significantly aid the Emergency Room residents in a standardized data collection process. Further, the warehousing of this standardized data set will allow for large-scale retrospective studies on patient demographics, symptoms, treatment protocols and outcomes.

References


