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ICCR Proposal

TITLE: Improving Medication Errors with Automated Physician Sign outs

LAY ABSTRACT:
It is clear that physician hand offs that require manual entry and updating of medications by primary doctors creates significant errors in medication lists, which can result in severe adverse events. In this study, we attempt to examine the effect of automating medication lists on physician sign outs on the rate of medication order entry errors made by residents on a general medicine service.

In this study, a four week block of time will be examined in two consecutive years. Every admission to the general medicine service will be enrolled in the study (approximately 200). In between the two study periods, a system for physician hand offs in which patient medications will be automatically entered into the patient information sheet carried by covering physicians will be started. Interns and patients will be approached on admission for their consent to participate in this study.

As no procedures will occur during this procedure and the risk to patients and interns is extremely low, there are no ethical dilemmas associated with this study.

STUDY PURPOSE:
The limitation to an eighty hour work week for resident physicians has affected many aspects of patient care, both in positive and negative ways. Residents are clearly less tired while on duty and therefore less likely to make mistakes, but a secondary effect has been the increase in the number of hand-offs between physicians. In a survey study of 202 medicine residency programs, it was found that the number of physician hand offs increased an average of 11% (from 7.0-7.8).[1] In addition, these increased handoffs were associated with more patient care provided by covering physicians (53% in the year after the 80 hour work week was instituted).
The major danger of these increased hand offs and increased patient care provided by covering physicians is the adverse events associated with mistakes made due to incomplete knowledge of the patient. The magnitude of this risk appears staggering—an almost 6 fold increase in the odds of adverse events during periods of coverage.[2] Interestingly, these adverse events were most likely to be associated with errors in omitted content on their sign out—specifically medication lists.[3] These omissions gain further significance as it is evident the error rate is extremely high. In one retrospective analysis, the error rate of medications between the order entry system and the physician sign out system was 27%. Furthermore, 54% of these errors were likely to cause moderate to severe harm.[4]
The major limitation to improvement appears to be time. With the number of medication orders written by one resident on one day, it is difficult to ensure that all the changes will be incorporated into the sign out for that day. A potential solution to this problem is to automatically link the order entry system to medication lists on a sign out. In this study,

we attempt to examine the effects of an automated medication lists on the rate of adverse events in this hospital.

HYPOTHESIS:
Automated computer based medication lists as part of physician hand offs reduces the number of erroneous medication orders written for hospitalized patients by medical residents

STUDY DESIGN:
Patient Selection:
Patients admitted consecutively to the general medicine 1 service (a housestaff run service on the inpatient medicine ward) will be enrolled in the study over two separate four week periods, placed exactly one year apart. In May 2008, the first set of control data will be collected. The intervention—automated medication lists in the physician sign out, will begin immediately after this four week study period. Then, in May 2009, during the same time of year in a four week block, another set of observational data will be collected. We expect approximately 200 patients in each group.

Intervention:
The intervention will create an Eclypsis based medication list that will feed into a printable sign out that will be used for all physician hand offs.

Outcomes:
The primary outcome to be measured is the number of pharmacy alerts for medication errors. When there is concern for an erroneous medication order, the order entry system will automatically alert the pharmacy. Every alert is recorded and can be retrieved in aggregate. The variable will be measured as categorical, measured as the proportion of patients admitted who had at least one alert after the first 24 hours of being admitted. Secondary outcomes to be examined will include length of stay, transfer to ICU (if the patient was transferred to the ICU during the stay), mortality, and adverse events—defined as drug rash, bleeding complication or transfer to ICU. These data will be ascertained via chart review at the end of the study period.

Statistical Analysis:
As the number of patients in each group is predetermined (based on the four week examination period), a chi square analysis can be used to determine effect size. Based on the current alert rate (40%) and the study group size of 200, the effect that can be shown through this study is a change of 14% in the alert rate.

STUDY PROCEDURE: None

STUDY DRUGS: None

MEDICAL DEVICE: None

STUDY QUESTIONNAIRES: None

STUDY SUBJECTS:
Consecutive patients admitted to the general medicine service during the two separate study periods who are able to consent either themselves or via a proxy will be included in the study.

Patients will only be excluded if they are a patient with a private physician (not on the ward service) as these patients will likely get orders written from non-housestaff physicians, and if they spend less that 24 hours on the medicine ward service.

RECRUITMENT OF SUBJECTS:
Patients will be enrolled as they are admitted to the general medicine service. Discussions will be held with the patients primary intern and attending physician prior to enrollment in the study.

CONFIDENTIALITY OF STUDY DATA:
Study subjects will be coded with a sequential numerical code and all identifying information will be linked to this code. Interns will be identified with a letter and all identifying information will be tied to this code. Only the investigators will have access to the data collected in the study.

POTENTIAL CONFLICT OF INTEREST: None

LOCATION OF THE STUDY:
All study participants will be admitted on one of the general medicine wards.

POTENTIAL RISKS:
There is no potential risks to the study patients as this is an observational study on an intervention that will not directly relate to patient care.

POTENTIAL BENEFITS:
Potential benefits to the study subjects include reduction in medication order errors and improved quality of care delivery as well as increased rapidity from initial communication to covering physician to intervention to assist patient.

ALTERNATIVE THERAPIES: None

COMPENSATION TO SUBJECTS:
None required as patients are not inconvenienced by the study.

COSTS TO SUBJECTS: None

MINORS AS RESEARCH SUBJECTS: None

RADIATION OR RADIOACTIVE SUBSTANCES: None

REFERENCES

1. Leora I. Horwitz, MD; Harlan M. Krumholz, MD, SM; Michael L. Green, MD, MSc; Stephen J. Huot, MD, PhD Transfers of Patient Care Between House Staff on Internal Medicine Wards. Arch Intern Med. 2006;166:1173-1177.

2. Laura A. Petersen; Troyen A. Brennan; Anne C. O'Neil; E. Francis Cook; and Thomas H. Lee Does Housestaff Discontinuity of Care Increase the Risk for Preventable Adverse Events? Annals of Internal Medicine. 1 December 1994. Vol 121 Issue 11. pages 866-872

3. V Arora, J Johnson, D Lovinger, H J Humphrey, D O Meltzer. Communication failures in patient sign-out and suggestions for improvement: a critical incident analysis. Quality and Safety in Health Care 2005;14:401-407.

4. Arora V, Kao J, Lovinger D, Seiden SC, Meltzer D. Medication discrepancies in resident sign-outs and their potential to harm. J Gen Intern Med. 2007 Dec;22(12):1751-5.