HAZARDS IN THE PRIMARY CARE OF ELDERLY PATIENTS:

A QUALITATIVE ANALYSIS OF PHYSICIAN HAZARD REPORTS

By

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A thesis submitted in partial fulfillment of

the requirements for the degree of

Masters of Science in

Industrial and Systems Engineering

at the

UNIVERSITY OF WISCONSIN-MADISON

July 6, 2009

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I would like to dedicate this thesis to my grandfather, Walter Mikolajczyk, to my parents and sisters, and to my partner, Steven Stone.

Thank you for all your love and support!

ACKNOWLEDGEMENTS

This study was supported in part by grant 1P20HS017115 from the Agency for Healthcare Research and Quality (to Karsh) and by grant 1UL1RR025011 from the Clinical & Translational Science Award (CTSA) program of the National Center for Research Resources National Institutes of Health. I wish to thank the physician participants and the practice staff for their commitment to the study. I also wish to thank Ben-Tzion Karsh, John Beasley, Paul Temte, Mary Ellen Hagnauer**,** Jon Temte, Tosha Wetterneck, G. Talley Holman, Richard Holden, Sam Alper, Calvin Or, and A. Joy Rivera for their intellectual contributions and guidance during this project, paper, and graduate career. I would also like to thank Katherine Pronschinske, Lisa Kietzer, and Michael Grasmick of the Wisconsin Research and Education Network for their valuable contributions towards the coordination of this study.

ABSTRACT

Purpose: To identify hazards in the primary care of elderly patients through physician hazard reporting. **Methods:** Fifteen primary care clinics throughout Wisconsin (8 urban, 7 rural; 10 electronic health record (EHR), 5 non-EHR; 13 family medicine, 2 internal medicine) were recruited. Physicians reported hazard during primary care visits for 10 clinic days. **Results:** Six major themes have emerged including *difficulties with time and scheduling, patient not following doctor's recommendations or directions, lack of coordination between physician and outside care professionals, patient – context of care misfit, difficulties with medication management,* and *missing or incomplete information.* **Conclusions:** There are a variety of hazards that can affect the quality and safety of care that doctors provide to their elderly patients. The six major themes that were identified can be divided into two larger themes: information-related hazards and patient-related hazards. Information-related hazards may impair sensation and perception of information, decision making, and memory. Because elderly patients generally have more issues that need to be addressed during an encounter, are on multiple medications, and may also have difficulty with memory, the physician's mental resources may be severely taxed in the absence of systems designed to support their performance needs. Patient-related hazards suggest the need for practice redesigns that better support the requirements of patients.

INTRODUCTION

The recent special issue in the New England Journal of Medicine[1, 2] made the case that primary care in the US is under stress:

- "The work of primary care is itself overwhelming. Primary care physicians often go home worried that they may have made mistakes, or dispirited because they did not complete their work" [1] (pg 2085).
- "…it's the tyranny of the 15-minute visit. If you come in to your practice in the morning and you see that you have 12 to 15 15-minute visits in the morning and another 12 to 15 15-minute visits in the afternoon, and you know you can't do it all in 15 minutes …just to do chronic and preventive care would take 18 hours a day to do it right. [2] (pg 2).
- "For primary care physicians… the perspective is one where there is too much to do – too many patients, too many demands, too much information flowing through, too little time to do a good job" [2] (pg 1).

Though not stated explicitly, these realities suggest that primary care in the US has a significant patient safety problem. This has been confirmed, with evidence demonstrating that medical errors and preventable adverse events occur in ambulatory primary care settings, and affect children, adults and the elderly [3-5]. The incidence of preventable errors or adverse events in primary care is high and evidence suggests that over half may be preventable [6-8]. This should not be surprising as the nature of primary care makes it highly susceptible to safety problems. Primary care functions include first contact care, longitudinal care, comprehensive care, and coordinated care, [9-12] which requires primary care physicians to deal with multiple patient problems per visit. [13] This makes primary care exceedingly complicated and puts a great burden on the primary care physician in terms of coordination, information seeking, information need, mental workload and decision making[14].

The situation may be even more severe with elderly patients. The elderly consume about one-third of all medications in the US and are more susceptible to adverse drug events[5, 15-17]. They have higher rates of diabetes, hypertension, heart disease, cancer, arthritis, activity limitation caused by conditions, and self-reported poor or fair health [18, 19], which means that they present to primary care with more problems[13]. The elderly are also at increased risk of disorders affecting their decision-making and memory, such as Alzheimer's disease[20]. These additional cognitive problems likely increase the complexity of care for the clinician by calling into question the reliability and comprehensiveness of patient reported symptoms, history, medications, and thus increasing the number of decisions made regarding diagnosis and treatment.

To date however, our knowledge of patient safety in primary care, including studies on the elderly, have focused primarily on adverse events and errors[6-8, 15, 16, 21, 22]. From a safety engineering perspective[23, 24], this evidence, while informative, falls short of fully addressing all the issues that affect the safety of care. The reason is that studying adverse outcomes and errors only sheds light on a fraction of safety problems; it leaves out what is considered to be the most important type of safety data: hazards[24-28]. "Hazard" is a safety term that that is analogous to "risk factor" in health care or epidemiology[24]. Hazards do not necessarily lead to errors or harm, but they increase the risk of them. Some hazards increase the risk of errors, and errors themselves may be hazards for patient harm. It is well recognized in safety engineering that the heart of safety lies not in controlling injuries or errors, but in controlling hazards[25, 26]. Hazards can be located anywhere in a healthcare delivery system, especially in the interactions between clinicians, patients, culture, tasks, environment, workflow, tools, and technology[23, 24]. Hazards increase the risk of an unwanted outcome, where such an

outcome is an error, a violation, clinician harm (e.g. needle stick) or patient harm. Once hazards are identified, they may be corrected before an unwanted outcome occurs. Importantly, hazards are conceptually more blame-free than error or adverse events since they do not indicate mistakes or harm; they are therefore more likely to be reported[29]. Hazard identification and analysis provide data for organizations to use to make sense of their safety situation and prioritize patient safety efforts [27].

Because of patient safety concerns in primary care, especially related to elderly patients, and because of the lack of data on primary care hazards, we conducted a study to identify hazards in the primary care of the elderly in ambulatory practices. Three methods of hazards identification were employed: observations of elderly patient visits with their primary care physician, physicians directly reporting hazards on a website developed for the study, and focus groups with physicians and elderly patients. Here we report on the hazard reports generated by physicians.

METHODOLOGY

Methodology Overview

Study Design

Physicians from each practice visited were asked to complete an online questionnaire for ten clinic days in which they reported (1) the hazards they experienced while caring for elderly patients, (2) the possible consequences of these hazards to the physician, the care processes, and the patient, and (3) ways that these hazards might be prevented. The study was approved by the University of Wisconsin -Madison Institutional Review Board (IRB) and the IRBs of the individual practices.

Participants and Settings

Fifteen physicians in fifteen different practices throughout Wisconsin and Iowa participated in this research. Seven were located in rural areas and eight were located in urban areas. Ten clinics used electronic records, while five relied on the use of paper records. Thirteen physicians specialized in Family Medicine and two in Internal Medicine. Demographic data were not collected to protect the identity of both the physicians and patients.

Recruiting

Practices were recruited by emailing physician members of the Wisconsin Research and Education Network (WREN), a practiced based research network, inviting them to participate in the study. Interested physicians were contacted by study coordinators to provide details. The first 15 physicians from 15 different clinics that responded to the email and who routinely saw elderly patients were accepted. Each physician was compensated $100 for their involvement in the study.

Methodology for Hazard Reports

Training

A graduate industrial engineering student trained in hazards observations, gave the physician a two page document that defined a hazard, described the process for reporting hazards, and provided three sample scenarios that included hazards. Physicians received a daily e-mailed reminder from a research coordinator that contained a unique identifier they could use on the website, and a link to the reporting webpage.

Physicians were given the following definition of a hazard:

> "Hazard" is a safety term that is analogous to "risk factor" in health care or epidemiology. Hazards do not necessarily lead to errors or harm, but hazards increase the risk of them. Some hazards increase the risk of errors, and errors themselves may be hazards for patient harm. For example, smoking is a risk factor for lung cancer, it won't necessarily lead to it, but it could. And in primary care, not being able to find information in the electronic health record or in a paper chart might not necessarily have a negative outcome, but it could. Put simply, a hazard is anything that frustrates you, is a barrier to care, might lead you to make a mistake or error, or affects your ability to provide the exact kind of care you want to provide."

Three sample scenarios were created by the research team that described an ambulatory elderly patient encounter and identified hazards. Possible consequences to the patient and to the physician or care processes were identified as well. Physicians were also given a printed copy of the hazard reporting webpage that was filled in with a sample scenario which the industrial student used to review the website reporting process with the physician.

Hazard Reporting Website

The hazard report website was created using the program WebSurvey@UW. On the first page the physician was asked to enter his or her unique identifier that had been e-mailed to him or her along with the link to survey. Also on this first page, the physicians were asked, 'Did you work in the clinic today and did you see elderly (aged 65 and older) patients?' If the physician answered 'No,' she was taken to the end of the survey which said, 'Thank you for responding. We will be checking in again tomorrow -- unless you are done in which case we will look forward to speaking with you during the focus groups in the coming months.' If the physicians entered 'Yes', they were taken to a page with the following introduction:

> Think back to the elderly patients that you saw for appointments today.
> You will have the opportunity to provide valuable information on each of these encounters using the reporting tool below.

Did anything occur that frustrated you, that was a barrier to providing care, or that affected your ability to provide the exact kind of care that you wanted to provide?

- Any problems locating patient information or test results?
- Any communication problems with the patient, other clinicians, clinic staff, or the insurance company?
- Did time pressure or difficulties with a technology make it difficult to provide the kind of care that you wanted?

The next four questions were asked with regard to each elderly patient encounter reported that day. The questions were as follows: (1) What were the hazards you encountered today related to this patient and what was the context in which they occurred? (2) What were the potential consequences to you or the patient care processes? (3) What were the potential consequences to the patient? (4) What change(s) do you think could be made in order to prevent the hazards that you reported from happening again?

The last question asked: Did you have any more visits with elderly patients today in which hazards occurred? If the physician entered 'Yes,' another page would appear with these questions again and if 'No,' she was taken to the last page of the survey.

Analysis

We used an inductive approach to analyze the hazards [30], starting with a thematic analysis [31] to understand and indentify what type of hazards were reported. The following 6 steps were followed by the coder (JL, industrial and systems engineering graduate student trained in qualitative methods): (1) Become familiar with the data, (2) Generate initial codes, (3) Search for themes, (4) Review themes, (5) Define and naming themes, and (6) Produce the report [31].

The qualitative analysis program QSR NVivo[32] was used to analyze the data. Hazards were coded using the physicians' own words (*en vivo*). This created over 100 initial codes

and definitions. Any terms not understood by the coder were discussed with a physician team member (J.B.) who explained the concept. Segments of text that could be categorized under multiple nodes were noted in a coding journal. These segments of text were then discussed with research team members to determine the most salient hazard.

After refining the themes, each theme name, definition, the nodes under the theme, and examples from the theme were assembled in a code book. The code book was then reviewed for face validity separately by a professor of industrial and systems engineering with expertise in safety engineering (B.K) and a physician on the research team (J.B.) with expertise in primary care. After reviewing the code book individually, B.K., J.B., and J.L. met to reconcile disagreements and iterated until consensus was reached. One area of concern that was discussed during this coding meeting was that some reported hazards seemed to be more exogenous and others more endogenous. Depending upon where one looks at the chain of causality, a hazard may be both a cause and an effect of subsequent hazards or consequences. For example:

patient arrived late → physician rushed → physician missed information → missed diagnosis → death

In this case the patient being late was a hazard contributing to rushing the visit; rushing the visit is also a hazard, which contributed to a missed diagnosis; the missed diagnosis is a hazard also, in that it may have increased the risk of the patient's death. All hazards were coded, regardless of their place in the chain of causality.

RESULTS AND DISCUSSION

Fourteen of the fifteen physicians participated in hazard reports. Physicians logged into the hazard reporting system a total of 75 days. On 43 of the 75 days physicians indicated that they had at least one elderly patient encounter in which a hazard occurred. The total number of patient encounters in which physicians stated at least one hazard occurred was 101. After analysis of the data, it was determined that 2 of the reports did not describe hazards and thus the total number of reports that contained at least one hazard was 99. The 99 reports that physicians submitted (Mean =7.1, SD = 14.9, Median = 3.5) contained 217 hazards, 148 of which were contained in reports from one physician. Fifteen themes and 84 subthemes emerged. Table 1 includes the definitions of fifteen major themes that were reported and Table 2 includes all fifteen major themes and their subthemes. Six major themes were identified. Each of these major themes was identified between 22 and 38 times in the 217 hazards. The next most prevalent major hazard theme was identified 8 times. Table 3 provides examples of hazards, consequences to patient, and consequences to care processes associated with the six most frequently reported themes: *difficulties with time and scheduling, patient not following physician's recommendations or directions, lack of coordination between physician and outside care professionals, patient – context of care misfit, difficulties with medication management,* and *missing or incomplete information.* Table 4 provides examples of prevention strategies that the PCP's provided for each of the top six hazards.

Not surprisingly, the most frequent theme reported was *difficulties with time and scheduling*. As emphasized in the recent special issue on primary care in the New England

Journal of Medicine[1, 2, 33] and by others[14, 34-37], primary care physicians frequently find themselves with too much to accomplish both within encounters and out of encounters and not enough time to complete their tasks. Although data suggest that the length of encounters is increasing[36], physicians continue to feel the effects of time pressure. This may be due to the fact that the number of clinical items addressed per visit is increasing at a pace that exceeds the increase in visit duration. [36] Physicians reported that the potential consequences of time pressure could cause them to miss important information, to make mistakes, and to not meet the needs of their patients.

The next most common hazard, *patient not following physician's recommendations or directions*, is inherent in working with any group of people. Patients will make their own decisions regardless of physician recommendations or decisions. Physicians reported several hazards due to patients not following the treatment plans or starting treatment plans but then changing them without notifying the physician. Although it may seem wrong or uncomfortable to blame the patient, the physicians reported these as hazards to care. It is likely that some of these hazards were caused by other factors such as money, depression, or literacy, but we cannot interpret what the causative factors were, and therefore we can only faithfully report on the data we have. Although patients may sometimes contribute to medical errors[35, 38, 39], a patient may also prevent a medical error, for instance, by letting the physician know that he is allergic to the medication the physician was about to prescribe[39].

Another prominent hazard was a *lack of coordination between the primary care physician and outside care professionals*, an issue very prominent in the primary care literature[14, 21, 22, 34, 35, 40, 41]. Coordination is one of the key components of primary care[12, 14] and well coordinated care can lead to positive outcomes such as increased physician and

patient satisfaction, higher quality care, and more completed referrals[41]. Physicians commonly reported having difficulty making decision about a patient's care when all the needed information from other health professionals was not available at the time of the encounter.

Hazards categorized under *patient-context of care misfit* included mental, physical and personality factors about the patient that made it difficult for the physician to provide optimal care during the visit. These factors included acute or long-term physical and mental difficulties, but also included things such as finding transportation and difficulty getting care due to misunderstandings or dissatisfaction with care. These types of hazards are once again inherent in working with people and have been documented in the literature[14, 34, 38].This category is unique because these hazards may not be hazardous in all situations. For instance, a unilingual Spanish-speaking person may have difficulty communicating with a physician if the clinic does not have a Spanish-speaking physician or a translator available, but there is no misfit, and no hazard, if one of these resources is available. Another example is working with a patient who has trouble remembering his medications may not be a problem if a supportive caretaker is available and comes to appointments. It should be noted that many of the hazards listed under the other themes may be caused by hazards in the *patient-context of care misfit* theme. For instance, a patient may have forgotten to fast before a lab test because she was having difficulties with memory; however if the reporting physician did not explicitly state this, we could not infer that was the underlying hazard.

Difficulties with medication management, discrepancies between what the patient is actually taking and what is recorded on the medical record, and medication errors are common in primary care[5, 6, 21, 22, 34, 38, 39, 42, 43]. Because elderly patients in primary care

present with more problems than the average population, [13] managing and coordinating the medications of these patients can be a complex process. Not only did physicians report difficultly managing multiple medications, but they reported having to do so without being certain of all the medications the patient was actually taking. Specific hazards reported included the patient having medication prescribed by different physicians, the patient not remembering which medications they are on, or the patient having stopped a medication. Sorting through medications lists is not only time consuming and a potential source of stress for physicians, but it can have potentially life-threatening consequences for the patient if reconciliation is difficult or not possible.

Missing or incomplete information was a major theme that ran throughout each of the five of other major themes, and has been reported previously[14, 21, 34, 38, 44, 45]. If a physician does not have all the right information at the right time to make decisions, there may be delays for the patient and the physician, inappropriate treatment advice, or a multitude of other possible problems. This hazard theme included situations where PCPs were concerned they might not even be aware of missing information.

One unexpected finding was that the frequency in which physicians reported hazards due to computer difficulties, which includes electronic health records, was very low. This was "unexpected" because, during the observational portion of the study, the observer noted repeated difficulties with electronic health records crashing, physicians not being able to locate information in the electronic health records, and electronic health records interfering with patient-physician communication. It was also unexpected because a recent US National Research Council report[46] suggested that current health information technologies failed to support the cognitive work of clinicians. However, in the hazard reports, there were only

three reports of problems relating specifically to computers. One explanation for this low frequency may be due the phenomenon of normalized deviance[47]. Because physicians are so used to having difficulties with the electronic health records the hazard is not as apparent to them as it is for an outside observer in the same situation. This illustrates the importance of using multiple methods to identify hazards in a complex system. Two physicians did report on having difficulty locating information in the patient chart which in these cases was the electronic health record. This subtheme fell under the theme *missing or incomplete information*. Although the information may have been difficult to locate due to an issue with the EHR interface, because the physician did not explicitly state that this was the issue, these identified hazards were coded under *missing or incomplete information*. Even if these two hazards were coded under computer difficulties *missing or incomplete information* would still have been one of the top six hazards and the number of hazards in which computer difficulties were reported would have still been of low frequency with only five hazards reported.

Limitations

Because this study was qualitative in nature the frequencies of the hazard reports does not reflect a rate of how often these hazards actually occur in primary care, but were based on the number of hazard reports physicians submitted. Because reporting was voluntary, it is in fact quite likely that many more hazards occurred that physicians may not have interpreted as hazards. Because of the open-ended questionnaire format of the study we were unable to ask follow up questions about hazards the physicians reported. In addition, when physicians mentioned several hazards during an encounter it was not always readily apparent which hazards were deemed the most important. It is also possible that some hazards may have

been coded differently by researchers with different backgrounds. In order to ensure a rigorous coding process the coding scheme was reviewed by three members of the research team including a physician. Also the coder, J.L, was careful not to interpret what the cause of the hazard might have been. For instance in the excerpt below the hazard may have been due to difficulties with coordination, but it is unclear where the failure in information transfer occurred. Perhaps the information was received by the practices but was lost or not entered into the chart. It *is* clear that the information is not present when it is needed and thus this excerpt was coded under *missing or incomplete information*.

> "I was to do a H&P for the second cataract removal which would have been easy if the other local hospital had sent a copy of the H&P done 2 months ago but instead I had to do it all over again."

The results of the study may not be generalizable for two reasons. Although we tried to get a diverse sample of physicians regarding location, type of practice, and use of electronic health records, we accepted the first 15 practices that were able and willing to participate in our study. Also, one physician identified 148 of the 217 total hazards (68.2%). Yet even when this physician's data are eliminated from analysis, the top 6 themes are still the most reported. Perhaps this physician was highly interested in this study and was more sensitive to possible hazards in his/her practice.

CONCLUSION

The six major themes that were identified can be divided into two larger themes: information-related hazards and patient-related hazards. Information-related hazards include the themes of *difficulties with time and scheduling*, *lack of coordination between physician*

and outside care professionals, *difficulties with medication management*, and *missing or incomplete information*. The underlying information related problems appear to be simultaneous information overload, information underload, information scatter, information uncertainty, and erroneous information. We call this collection of information hazards "information chaos." Information chaos is an especially concerning hazard because it is information that is central to the success of many cognitive tasks,[48] and diagnosis and treatment are cognitive tasks. Information is central to a range of cognitive tasks, such as decision making, because it is information that must be found, arranged, coordinated, communicated and stored[48, 49]. Information chaos may therefore impair sensation and perception of information, decision making, and memory[50]. Because elderly patients generally have more issues that need to be addressed during an encounter, are commonly on multiple medications, and may also have difficulty with memory, the physician's mental resources may be severely taxed in the absence of systems designed to support their performance needs. In such cases, the demands imposed by the system (e.g., physician needing to remember the important facts of the most recent patient visit while starting the next patient's visit) may exceed the attentional resources or mental capacity of the physician. In such cases, cognitive performance suffers greatly; that means reduced ability to spot problems, treat, diagnose, remember, and understand information.

The second category, patient-related hazards, includes the themes of *patient not following physician's recommendations or directions* and *patient – context of care misfit*. These hazards suggest the need for practice redesigns to better support the needs of patients, including reminding the patient of how to prepare for a test, helping arrange transportation to appointments for them, and better coordination between systems so that physicians can rely

less on the memory of patients and more on the information that is needed being at their finger tips and presented in an organized and intuitive manner at the time of an encounter. Several strategies have been proposed that may reduce the hazards reported. One example is restructuring the concept of the visit to include a pre-visit, visit, post-visit, and between-care visit to facilitate medication reconciliation and make sure preventative and chronic care tasks are up to date. [2] Others have suggested tactics such as pre-appointment labs, chart prepping so information does not have to be searched for, pre-appointment questionnaires, empowering nurses, and using dictation templates for standardized parts of the appointment. [51] Other recommendations for reform in primary care have included working in teams which can include physicians, physicians assistants, nursing staff, and a receptionist, advanced access or same day scheduling, collaborative goal setting, group medical visits, and advances in electronic health records.[52] These suggestions have the potential to reduce the reported hazards, each in different ways or some in combination, but more research is needed to determine how effective these different strategies could be.

One might wonder if some of the hazards are just challenges of being a primary care physician, and not hazards, per se. For example, should we not expect that physicians will necessarily have difficulty managing medications for elderly patients? Should we not expect that physician will experience time pressure when s/he has to work through 10 different problems in a 15 minute encounter? Although these situations are usually an inherent part of primary care this does not make them any less hazardous to the safe care of patients. It is true that for most physicians they come with the territory, but that also means the territory itself, is unsafe.

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Table 1: Themes and Definitions

Theme	*Definition*
Difficulties with time and scheduling	Physician does not have time to accomplish all tasks that s/he had wanted to accomplish during the encounter or while working in the office.
Patient not following physician's recommendations or directions	The physician recommends a specific treatment or asks the patient to follow certain directions, but the patient does not follow the directions. The patient may have followed directions initially but then decided to stop treatment without informing his or her physician until the next encounter. This can also include the patient coming to the encounter unprepared to have a lab done because the patient did not follow directions (e.g. not fasting).
Lack of coordination between physician and outside care professionals	There is a lack of communication and coordination with outside care professionals and facilities which may include hospitals, EDs, CBRFs, and any specialists that the patient may have seen.
Patient –context of care misfit	Specific mental, physical, and personality factors about the patient make it difficult for the physician to provide optimal care during the visit. These factors can include acute or long-term physical and mental difficulties that the patient has, but can also include things such as finding transportation and difficulty getting care due to misunderstandings or dissatisfaction with care.
Difficulties with medication management	Physician has difficulty managing medications and determining which medications the patient is currently taking.
Missing or incomplete patient information	Physician is missing information or does not have complete information from the patient, from the patient's record, or from a partner's patient in the practice. If the information is available the doctor may have trouble locating it.
Patient does not have access to medication or care	The patient does not have access to particular medication or care because it is unavailable altogether or due to the cost.
Caregiver issues	Elderly patient's caregiver not present, unsupportive, or over-involved in patient's care.
Visit purpose inaccurate or incomplete	The reason listed for the patient's appointment is either inaccurate or incomplete.
Secondary patient issue	Physician must address the needs or answer medical questions about a person other than the patient.
Physical environment	The physical characteristics of the building or exam room do not support the needs of the patient or physician.
Computer difficulties	Computer is slow or freezes up during encounter or while physician is trying to dictate.

Mental strain on physician	Physician experiences discontinuity in thought process when he does not have all the need information during the encounter to make a decision. This results in having to follow up with the patient over the phone. The doctor may also experience irritability by being contacted when not on call or from staying in the office late.
Uncertainty about diagnosis or cause of problem	The doctor is unsure about what is causing a problem or what the diagnosis is.
Patient unable to contact nurse directly	Patient is unable to contact the nurse directly by telephone.

Table 2:Major themes and subthemes identified (part 1)

Difficulties with time and scheduling	**38**
• multiple problems or issues to address	12
• physician did not have adequate time to address all problems	10
• working with student delays or prolongs exam	4
• physician running late	2
• patient arrived late to appointment	2
• inability to achieve optimal control of medical conditions during the visit	1
• physician did not have time to return patient phone call	1
• high number of visits in one day	1
• desk did not sign in the patient	1
• double appointment	1
• physician must spend extra time to educate patients about immunizations	1
• patient delayed care	1
• patient comes in for urgent visit	1
Patient not following physician's recommendations or directions	**33**
• patient refuses or will not follow treatment or directions	9
• patient did not or will not come in for follow up	5
• patient continues unhealthy habits	4
• patient unprepared for test	3
• patient stops medication due to warning information from pharmacist	2
• patient stops medication due to report in the media	2
• inappropriate use of medications	2
• patient's medication is expired	1
• patient states she has allergies to dyes used in meds	1
• patient routinely refuses preventative measures	1
• lack of interim BP readings	1
• patient refuses to go to CBRF	1
• patient not following food restrictions	1
Lack of coordination between physician and outside care professionals	**31**
• missing or incomplete information from outside care facility	14
• medications added or changed by physicans(s) other than PCP	8
• delay of care	2
• patient may have been put on unnecessary medication	1
• nurse made request for order before determining problem	1
• patient sent to PCP clinic instead of ER	1
• PCP not involved in patient's hospital care	1
• miscommunication between physician and CBRF	1
• patient given wrong medication instructions	1
• hospital sends test results to physician but takes no action	1
Patient – context of care misfit	**28**
• patient memory	5
• patient gives non-specific complaints	4
• patient has difficulty getting places for medical care due to transportation	3
• patient is stressed due to nonmedical problems	3
• patient may not be competent	1
• patient does not trust specialist	1
• patient physical characteristic makes encounter difficult	1
• patient wants different treatment than physician	1
• language barrier	1
• patient is hard of hearing	1
• patient thinks she has particular disease	1
• patient dissatisfaction with care	1
• patient frustration	1
• patient has false ideas of how assistive device can help	1
• patient wants physician to fill out form of questionable validity	1
• physician concerned about possible medication abuse	1
• physician feels forced into giving med	1
Difficulties with medication management	**26**
• uncertainty of current medications	11
• multiple medications	5
• medication insurance difficulties	5
• polypharmacy	2

• different generics at pharmacy	1
• patient has medications at several pharmacies	1
• patient has tried multiple medications without success	1
Missing or incomplete patient information	**22**
• missing or incomplete information from patient	4
• missing or incomplete information in patient's record	4
• missing or incomplete information for partner's patient	3
• physician has difficulty locating information in patient chart	3
• repetition of test or exam due to missing information	2
• labs did not get ordered	2
• other caretaker missed diagnosis	2
• no advanced directives on file for patient	1
• chart cannot be located	1
Patient does not have access to medication or care	**8**
• medication cost	4
• medication unavailable	2
• patient sent home from hospital without medication	1
• patient refuses physical exam due to cost	1
Caregiver issues	**7**
• minimal support or lack of appropriate support from caregiver	4
• physician must coordinate with patient's home caregiver(s)	2
• family member unable to attend appointment	1
Visit purpose inaccurate or incomplete	**6**
Secondary patient issue	**5**
Physical environment	**4**
• patient unable to get on exam table	2
• difficulty with layout of room	1
• clinic building set up	1
Computer difficulties	**3**
Mental strain on physician	**3**
• physician becoming depressed from reporting hazards	1
• discontinuity of thought process	1
• physician works long hours	1
Uncertainty about diagnosis or cause of problem	**2**
• physician unable to determine cause of problem	1
• uncertainty of diagnosis	1
Patient unable to contact nurse directly	**1**

Table 3: Selected Hazard Examples and Consequences for Top 6 Themes.

Hazard Example	Consequence to Patient Care Process	Consequence to Patient
Difficulties with time and scheduling	**Difficulties with time and scheduling**	**Difficulties with time and scheduling**
• Came to have ears irrigated. Had wheelchair and crutches. By the time we cleaned out his ears I didn't have adequate time to assess his BP, Possible sinusitis and smoking cessation, which hopefully he will do with his primary on f/u • 76 yo-c/o plugged ears-given 15 minute appt-also ongoing problems with rhinitis, dry mouth from Sjogren's, grief recent from death from her husband • Needs multiple health maintenance things but so many other things like DM require more attention and I have to decide on priorities.	• Takes longer to finish with a patient and I didn't dictate his report from an 8am appointment until 9pm because of the long day. • Explaining things to the elderly takes a great amount of time, and I'm not sure how much they take in so we keep repeating it and giving literature to help them remember • Poor care, frustrated physician, frustration of patients that were scheduled after this patient • …I still had 4 other patients scheduled after her (every 15minutes) and was certain they would be coming. Policy is that we will put a patient in a slot if another patient doesn't come in, but we try not to just squeeze an elderly patient in between others. They usually need more than 15min and then you have the remainder of your patients going behind which is not fair to them nor the level of service we strive to provide in our clinic.	• Errors due to lack of time and information. • May miss potentially significant problems • Too much to discuss in a single visit with too much to remember • Missing something as I am rushed to try to cover the issues that came up
Patient not following physician's recommendations or directions	**Patient not following physician's recommendations or directions**	**Patient not following physician's recommendations or directions**
• Refuses statin because of new media. • She now has to be on Crestor but the pharmacist gave her information which apparently said that it might be harmful to her Kidneys and now she doesn't want to take either Crestor or Lipitor which both apparently have the same warning on information from the pharmacist.	• Labs may not be accurate due to med non compliance, and things like alcohol may alter results also. • Doesn't follow up until I refuse to fill meds, which I fill first for a month, then for 2 wks, then only until her visit. This causes her more co-pays I believe, and may lead to non compliance. She is really accountable	• Doesn't take meds appropriately. Had side effects when she stopped her Effexor abruptly because she didn't feel depressed anymore. She took extra pain meds to sleep and got constipation. Then didn't take pain meds and had additional pain. Refused VNA and in home PT, leading to poor healing.

• Patient with pulmonary embolus refused to continue lovenox injections, because they required him to miss work as a truck driver. • Felt her beta blocker made her urinate too much (as diuretics have in the past) explained that she was not on a diuretic. Refuses med but compromised that she could stop for up to 1 mo checking her BP daily wrote parameters and she agrees to restart in 1 mo or if BPs are out of parameters. Will f/u in 1-2 mo	to no one.	• Lack of coverage for her hyperlipidemia. If I had not called for another reason and brought up the subject she may still not be taking the medicine and not protected. • Noncompliance may cause recurrent respiratory problems. • Heart attack or death
Lack of coordination between physician and outside care professionals	**Lack of coordination between physician and outside care professionals**	**Lack of coordination between physician and outside care professionals**
• Seen at [hospital], a hospital [outside of our system] who sends information bit by bit, or leaves it in a mail box which I don't pick up as I have given up being on staff due to these type of problems. No d/c summary available. • Some records were faxed later. … but even with the d/c summary I don't know. Hospital later faxed an EKG with new ischemic changes not addressed during the hospitalization, which I now have to contend with. • Had multiple surgeries and changes last year with prolonged hospitalizations and complications due to bladder and urethral cancer. I don't have good follow-up from the outside hospital, if they sent something it may have been several months ago and I don't have ready access to it. • seen today 67 yo woman who received narcotic medications from 3 different doctors • CBRF didn't change meds I was to follow up on today allegedly because we just gave	• complications from meds/treatments by multiple decision makers not acting in concert. • Baseline status of a patient in the nursing home unknown to me or nursing because of rapid turnover. Nurse had no knowledge of patient. • Just really crappy care, no communication, lots of potential problems. • Potential for error. Time wasted and condition not controlled when midlevel provider changed Rx without inquiring as to what was being done and why. This was not the condition the patient presented with. • Care provided by hospitalist different than what I would have done knowing the patient. However similar things happen when they are hospitalized out of town.	• unneeded suffering, longer time to make proper care adjustments, confusion about treatment recommendations (when they conflict). • the missing recent medical record information could have had a serious impact on his care. • Slow delivery of care, inability to adequately treat situation, possible medications interactions. • Incomplete or erroneous follow-up care in clinic. • Undiscovered cardiac problems. Potential uncovered infection. Loss of control on my part of the patients medical care and yet I am still responsible. I will have to continue to work on this tomorrow and probably several days with the weekend coming where I would rather not be working.

a verbal order and they were waiting a month for a written order		
Patient – Context of care misfit	**Patient – Context of care misfit**	**Patient – Context of care misfit**
• Speaks only limited English and things are translated by her significant other, employer, (she is his housekeeper but they function as husband and wife for many things) • Patient's inability to sit for prolonged periods due to disc disease in this pre op eval. • unable to provide specific information about complaints • Can't come in the morning because she can't get a ride. • Can't remember things she wanted to discuss as she didn't write them down. • Wasn't sure what he was following up for and was therefore unprepared for the visit including only bringing some of his meds.	• Didn't seem to understand medicine instructions. • Exam less complete and not done fully e.g. pelvic etc. due to patients inability to sit/Lie without discomfort. • patient has obvious needs and has dementia but has not been found incompetent; family is not willing to push her to do anything, and she calls all doctors "as**oles" tends to frustrate you and you just give up	• Improper dosing. • Missed diagnoses • over sedation, inadequate pain treatment • she needs safer living environment, possibly dementia drugs; won't get because of complex situation, too short a time to figure it out. . .
Difficulties with medication management	**Difficulties with medication management**	**Difficulties with medication management**
• Is on 14 meds some local some send out some generic some brand some medically necessary some with prior approval, some formulary changes. • Unaware of meds. "3 in the morning and 2 at night" Unsure what they are for. • Didn't bring in meds so I could find how many are left and which need refills. • He went to the Pharmacy which filled his NSAID which was generic but didn't fill his PPI as it wasn't on formulary. Excessive time has passed and he may get an ulcer, I have had to submit that he failed Prilosec, which doesn't have the NSAID gastritis indication and may not cover him.	• unknown medications interfere with medication management. • mix up of meds, spent lots of time finding correct meds that she is on • Too many sources for error and too many problems and meds to give attention to. • I didn't hear about the med not being filled for several days and still don't have prior authorization.	• medication interactions, increased fall potential. • Meds may be filled incorrectly in the future. • taking wrong or inappropriate meds or doses • Potential for medication list being inconsistent with drugs used by the patient. • Death, GI bleed, pain.

Missing or incomplete patient information	Missing or incomplete patient information	Missing or incomplete patient information
• I needed to determine when the patient had been started on Zocor. This information was not easy to locate in the EMR. I had to review old paper chart records. • EMR patient list was very difficult to follow. I spent sometimes several minutes scanning my patient list attempting to locate the patient on whom I wanted to dictate. This occurred for multiple patients. • Baseline A1C unknown to me so I don't know how well they are controlled. • Stated in the visit that he had x-rays indicating a "fracture" but only 15 minutes into the visit did he mention he had been to a chiropractor. • Lab reports from previous old volume were not available in today's 3rd volume of charting. • I was to do a H&P for the second cataract removal which would have been easy if the other local hospital had sent a copy of the H&P done 2 months ago but instead I had to do it all over again. • labs I'd wanted and thought were ordered from Friday were not done/available.	• Redundant labs requested. • Full history may be unknown to me even though a partner may know it. • Significant delays in work flow. • potentially ordered a test that she already had-unnecessary testing • Delay in labs. • delay in providing info and adjusting regimen appropriately.	• Expense • Incorrect advice or medication. • Less time available for meaningful Physician-patient interaction. • potentially ordered a test that she already had-unnecessary testing • Delay in care. • Possibly delaying addressing electrolyte disturbance or worsening of renal insufficiency. worry about possible impending stroke.

Table 4: Prevention strategies suggested by physicians

Theme	*Prevention Strategies*
Difficulties with time and scheduling	• Patient reminders • I could do several appointments. Should have CPE but won't allow as she can't afford so a problem based visit was recorded. Could only give 30 min today but I needed 45 and got behind. Truth in scheduling • If every patient brought a scribe to also listen and go over everything which is said at each visit more would be understood and remembered. • longer visits for elderly patients with multiple medical issues • We have thought about putting together a list of elderly patients with extensive problem lists and giving each of these patients a 30 min visit slot, which gives us more time with each patient and flexibility if car services or taxi's or late.
Patient not following physician's recommendations or directions	• I wish the pharmacist would quit giving generic computer based literature without understanding why a patient is on a particular med or without knowing the patient and their fears. • more of a team work approach; doctors in assisted living facilities or making visits at home or assisted living. . . • Hospital could follow up on patients to assure compliance with follow up • More regular visits.
Lack of coordination between physician and outside care professionals	• better record transfer and communication between PCP and specialist , better triage information as patient should have been sent to ER • Schedule visit (pt had problem for 5 days already), bring medications, obtain x-ray information prior to visit. • Hospital should transcribe all discharge summaries within 24 hr. • Mid level should have to contact primary care provider especially when changing their care. I'm not even sure who the mid level is so I can't get back to her. • somehow minimize caregivers or have their care easily coordinated and give consistent messages.
Patient – Context of care misfit	• I wrote things down. • Pt should be scheduled with PCP with ample time to assess medical condition and discuss potential placement issues. • Could have a form to list all of here symptoms to review before the visit. • have social workers available to see patients first if over the age of 65 to identify needs
Difficulties with medication management	• Gave a list of all her meds and explained what they are and when to take them with both her and her daughter who will only be here for one more day. Our med list prints but only lists .5 tab bid and not one halt of a 10 mg tablet twice daily meals for inflammation...etc. I therefore wrote it out in long hand which she may not be able to read, and it takes time. • Remind patients to bring in their meds even to visits not pertaining to the meds. • Give both generic and trade names and pictures of meds • I have gotten prescription assistance involved, gave him samples for now as well as coupons to help compliance. • Review the medication list at each visit
Missing or incomplete patient information	• EMR should have easy way to track when medications have been started, stopped. • EMR patient list needs to be improved and made user-friendly. • Staff could have gotten the last H&P available when they were prepping

	charts, but don't know enough to do so. • uniformity of EMRs nationwide • someone checking that the things I mentioned in note were translated to correct orders and timing coordinated to make sure results available for visit.