Prudent Layperson Standard: A Comparison of Decision Making Among Three Groups: Laypeople, Emergency Physicians and Primary Care Physicians

By

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A Thesis

Presented to the Department of Public Health and Preventative Medicine

And the Oregon Health Sciences University

School of Medicine

In partial fulfillment of

The requirements for the degree of

Masters of Public Health

May 1999

School of Medicine

Oregon Health Sciences University

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Acknowledgements

I would like to thank the following for their time, effort and support:

My Thesis Committee

Andrew Zechnich
Merwyn Greenlick
Paul Gorman
Dale Kraemer

Oregon Health Science University Medical Students:

Kelly Johnson
Tracy Weisberg
Farhood Farjah

Barbara LaBrosse from the Port Portland
Darren Coffman from the Office for Oregon Health Plan Policy and Research

Oregon Chapter of the American College of Emergency Physicians
Brad Higbee
Tiffany Branum

The Department of Emergency Medicine at OHSU for their input
The Department of Public Health for their support
The entire Fall 1998 Research Design class for the survey feedback

Abstract

Background: In November 1997, the Access to Emergency Medical Services Act of 1997 was passed. Within this Act were guidelines that required payment for emergency medical care by Medicare and Medicaid managed care programs. These guidelines are collectively called the Prudent Layperson Standard (PLS). In order to implement this standard, methods by which laypeople make decisions must be assessed. The medical decisions made by laypeople were compared to those of emergency physicians, as triage representatives, and primary care physicians, as gatekeeper representatives, to asses differences among the groups.

Study Design: A cross-sectional survey design was used.

Methods: The three groups compared were laypeople, emergency physicians, and primary care physicians. A survey instrument was designed to assess medical decision making among the three groups using common conditions that present to the emergency department (ED) of varying potential severity. The survey questions addressed urgency, location of care, transportation mode if going to the ED, and whether the issue was of importance. The survey was distributed to a sample of the two physician groups located in the Portland Tri-County area and administered to laypeople at three locations in the same region.

Results: Response rate for emergency physicians was 54%, primary care physicians was 44% and laypeople ranged from 15-33%, varying by location the survey was administered. The three groups differed significantly in overall medical decision-making regarding urgency ($p<0.0001$). In four of the five cases, there were significant differences among the groups regarding urgency ($p<0.0001$). The two physician groups

had non-significant differences regarding the level of urgency in four of the five cases. The physician groups each differed significantly from laypeople regarding urgency in the majority of cases. With the exception of two instances, the three groups significantly differed regarding location of care at each of the times studied ($p<0.05$). Mode of transportation differed significantly for the three urgent cases ($p<0.05$) among the groups. Overall, the three groups differed regarding the location for care and mode of transportation between 2PM and 2AM. Finally, greater than 50% of each group agreed that the PLS was an important issue. In addition, the emergency physicians (93% in favor of PLS) and the laypeople (61% in favor of PLS) did not differ regarding the circumstances in which emergency medical services should be paid.

Conclusions: This study revealed that there were significant differences in the overall medical decision making for the cases in the survey among the three groups studied. These differences, overall, revealed that laypeople perceived less urgency for the medical problems that had a greater likelihood of poor outcomes if not treated. These results may suggest that the Prudent Layperson Standard is unlikely to change emergency department usage significantly from current levels, and could result in an overall decrease. However, a larger, more generalizable study will be required to support these conclusions in populations other than the Portland Tri-county region.

Introduction

Emergency medical care as a specialty is a relatively recent phenomenon in medical history. Improved outcomes for many emergent conditions have resulted from rapid diagnosis and treatment afforded in the nation's emergency departments. This has not come without a price, however.

As the percentage of the gross domestic product (GDP) consumed by medical care has escalated, many control measures have been instituted, including payment by diagnosis related groups, and managed care. Among the cost cutting measures pursued by managed care plans, a decrease in the use of specialists and other expensive forms of medical care was pursued. The perception that many people used the emergency department for non-emergent medical issues resulted in the requirement for pre-approval by the health plan before emergency care could be sought or, more important to the managed care organization, reimbursed. Failure to attain the pre-approval was grounds for refusal to pay for services, leaving the plan member individually responsible for the resulting bill. This cost-containment measure for questionably emergent conditions made sense, but was not in the patient's best interest for emergencies. There are many horror stories of poor results from improper denials of reimbursement. For example, a 46-year-old woman was rushed to a Detroit emergency room in full cardiac arrest. Her husband had called 911 after she collapsed while getting out of a car. Despite efforts to save her, she died after 30 minutes at the hospital. After a few months, the bereaved husband received a call from the woman's HMO. The company wouldn't pay for the emergency room visit because the patient hadn't received prior authorization[1].

The emergency medical community, as well as other interested parties including some managed care organizations, responded to this situation by initiating a campaign to protect the patient's right to timely emergency care. This evolved into the Access to Emergency Medical Services Act of 1997, passed in November 1997 within the Balanced Budget Act of 1997. Within this Act, also referred to as the Consumer Bill of Health Care Rights, were guidelines that determined when payment for emergency medical care by Medicare and Medicaid managed care programs was required. These guidelines are collectively called the Prudent Layperson Standard. The definition of the Prudent Layperson Standard for emergency medical services is: "An emergency medical condition is defined as a medical condition manifesting itself by acute symptoms of sufficient severity (including severe pain) such that a prudent layperson, who possesses an average knowledge of health and medicine, could reasonably expect the absence of immediate medical attention to result in (1) placing the health of the individual (or, with respect to a pregnant woman, the health of the woman or her unborn child) in serious jeopardy, (2) serious impairment of bodily functions, or (3) serious dysfunction of any bodily organ or part."[2]

While this was a victory for the lobbying efforts of organized emergency medicine and others involved, this standard only applied to Medicare and Medicaid beneficiaries. However, during the drive to get this bill passed in the United States Congress, there were simultaneous efforts being made in several states to pass similar legislation affecting all managed care medical plans covering patients within their borders. Currently, more than 20 states have passed legislation guaranteeing standards

similar or identical to the federal Prudent Layperson Standard to all insured people living in these states.

A great deal of effort went into the development of this standard. There is a very large piece missing from this legislation, however. What exactly do prudent laypeople think are emergent conditions? There has been no organized search for an answer to this, leaving a large gap in the ability of the government, both regional and national, to enforce this standard. There have been no preliminary studies regarding the definition of the Prudent Layperson Standard performed and published in the current literature. This investigation is a pilot study to begin the process of defining emergent medical conditions from the viewpoint of a "prudent layperson."

In order to investigate the prudent layperson concept, it is important to delve more deeply into the background from which the need for this legislation grew, and into some of the essential concepts behind a meaningful evaluation of the standard. This background investigation includes four distinct areas: clinical decision-making, determination of emergency status, cost containment, and decreasing utilization.

Differences in Clinical Decision Making

Much debate exists as to whether it is appropriate for primary care physicians to act as gatekeepers to other health care services. Studies comparing clinical decision making between primary care physicians and medical specialists such as cardiologists have reported significant differences regarding medical decision-making[3-7]. Similarly, studies that begin to evaluate differences between primary care physicians and

emergency physicians have recently been published[8-10]. Each of these comparison studies have revealed significant differences, both in which cases were determined to be emergencies and which visits were determined to be appropriate to be seen in the emergency department. Overall, emergency physicians tended to view fewer conditions as emergencies, but a higher percentage as needing to be seen in the ED. While these findings are interesting, they do not point to whether the differences affect patient outcomes.

Several studies in the literature have begun to compare medical decision making of patients to that of physicians[11-13]. Most studies have focused on decision making with respect to chest pain. No studies have systematically evaluated whether there are differences in how patients make their decisions for emergency care compared to decisions made by medical experts such as emergency and primary care physicians. Differences in clinical decision making becomes particularly important when deciding whether a patient needs potentially life-saving care that the patient has already determined they need by virtue of their being in the emergency department.

Determining Emergency Status

Most managed care organizations have instituted gatekeeping requiring pre-authorization for emergency services before they are delivered to eliminate "inappropriate" visits and decrease costs. The policies that these organizations have regarding gatekeeping are varied and have many implications[14]. Many studies that evaluate methods for screening inappropriate emergency department use have been

published. Most have shown that these methods are unable to screen non-urgent conditions reliably[15-22]. The study by O'Brien et al concluded that there was only moderate agreement between different methods of determining appropriateness of ED use and advised caution regarding implementing protocols to restrict "inappropriate" ED visits. Birnbaum et al concluded from their study that a previously developed predictive model for refusal of care (developed by Derlet et al at UC Davis Medical Center) missed greater than 1% of patients that were determined to require hospitalization after their ED evaluation. A study by Lowe et al found that 33% of patients that would have been refused care according to triage criteria for non-urgent conditions were determined to have needed an ED evaluation and 4% were hospitalized. There are a few studies that show safety for limited triage of non-urgent patients, but they are limited to two primary authors and two emergency departments[23-27]. The study by Derlet et al supported the ability to triage out of the ED patients with non-emergency problems provided there was community support for follow-up care. In the second study, Gadomski et al concluded that diverting children classified as non-emergent in an ED to their primary care physicians can be safe short-term but did not impact subsequent ED utilization. This study also concluded that gatekeeping did not change the health care seeking behavior of the study patients. All of these studies used onsite resources, with a wide range of qualifications: from ED clerk to ED physician, to determine appropriateness of the patient's visit.

Considering the inability of on-site resources to adequately assess need for emergency services, one could conclude that decision-makers not physically located in the emergency department with the patient would also be unable to determine

appropriateness of the ED visit. Recent studies have appeared in the literature indicating an increased likelihood of adverse outcomes and poor medical care decisions associated with gatekeeping[28-30]. Furthermore, a disturbing study by Young et al revealed that a small percentage of nonurgent patients seen in the ED are hospitalized. These patients would likely have been sent away using most structured triage methods, resulting in potential harm done to the patients[31].

Cost Containment

Emergency department access control decisions are fueled by the perception that emergency department use is expensive and rising rapidly in the setting of inadequate funding [32]. Most studies are based on this assumption and create hypotheses that explore aspects of cost control and utilization[31, 33-46]. Some evidence supports the perception that emergency department care is up to two to three times more expensive compared to equivalent care provided by a generalist[47]. In addition, limited evidence supports the hypothesis that emergency physicians use more resources than generalists for equivalent medical problems[48].

Two studies specifically explore the cost of emergency departments. In the first, Williams et al found that the true costs of non-urgent care in the emergency department is relatively low and that diversion of nonurgent care to generalists would result in less significant savings than commonly expected[49-53]. This investigation broke costs of emergency department visits into two parts, the fixed operational cost and the marginal cost for the patient's visit. The operational cost is the cost of keeping the medical facility

open and operational and the marginal cost are the extra cost of caring for an extra patient. This study found that while the average charge for a non-urgent visit to the ED was $124, the actual cost was $62, $38 for operational costs and $24 for marginal costs. The comparative total charge for an office visit to a primary care physician was $45, with no breakdown based on operational and marginal costs available in the literature. The authors conclude that, while the actual charges for an office visit during regular business hours is less at the primary care physician's office, this cost savings is unlikely to persist for after hours office care.

The second study revealed that cost shifting was modest, with the uninsured paying for the bulk of their medical care themselves[54]. Tyrance et al concluded that there are high fixed costs associated with running an ED that will only increase charges for true emergencies if overall utilization decreases. This may result in pricing emergency department care outside the realm of possible repayment for the under- and uninsured that have very few options in many settings[55].

Decreasing Utilization

A great deal of effort has been expended to decrease utilization of emergency departments. Strategies used have included instituting gatekeepers, increasing the percentage of the patient population with a primary care doctor, and cost sharing, among others. Gatekeeping, the process of requiring approval from the patient's primary care physician, has become standard practice in managed care organizations[14]. Most studies that evaluate the effect of gatekeeping find a correlation with decreased utilization of the

ED for inappropriate care[34, 56-59]. As discussed above, this does not necessarily correlate with decreased costs. In addition, patients are dissatisfied when emergency care is denied by a gatekeeper[60]. Finally, subsequent utilization of the emergency department by prior users is not affected by gatekeeping[27].

Another strategy managed care organizations use to decrease emergency department utilization is to require the assignment of primary care providers for all enrollees. There is consistent evidence in multiple studies that this is an effective means to decrease use of emergency services[33, 37, 38, 40, 43, 61-64]. This means of decreasing utilization is only effective if the primary care providers are available for short notice visits. In a multi-center study performed by Kellerman et al, urban Medicaid recipients were found to have limited access to outpatient care apart from that offered by hospital emergency departments[55]. Physicians are working longer hours to maintain their income and consequently have less time to schedule drop-in appointments. The result is that these patients frequently are referred to the emergency department[42, 46]. A trend towards an increased number of insured patients using emergency departments for minor illnesses has been uncovered[45]. This reflects the value patients place on the convenience of being able to seek care when they have time to pursue it, such as after work or on the weekends.

Another means of decreasing utilization is through the implementation of financial disincentives for emergency department use. Several studies evaluate the effect of cost sharing on visits to the emergency department. Most have shown a decrease in utilization in the range of 15-40%, mostly among patients with conditions considered unlikely to be emergent[65-68]. In addition, Magid et al found no association between

delays in seeking care for acute myocardial infarction and a modest, fixed copayment for emergency services[69-71]. Implicit from these investigations is fear that patients with life threatening diseases are being discouraged from using potentially lifesaving resources. None of the above studies analyzed what happened to the patients that did not seek care due to the ED copayments.

The perceived incentives for health insurers to reduce emergency department visits and reimbursement are very strong. Many medical insurance companies have policies that either systematically or semi-randomly refuse payment for emergency department services without a full investigation into the validity of their members' claims. In Oregon, two large health maintenance organizations were fined in 1996 by state insurance regulators for improperly denying emergency department claims[72]. A study by Neely et al revealed that health plans are being fined for inappropriate ED claims denials and that complaints were registered against denials in 14 states. This study concluded that the results point to the extent to which claim denials are discovered by state insurance commissions rather than reflect the true incidence or extent of the practice of inappropriate denials[73]. It is probable that these policies have resulted in decreased utilization for fear that not even "appropriate" emergency services will be reimbursed.

Summary

In summary, this review covered four points. The first was regarding the differences in clinical decision making. The literature supports the view that physicians

trained in different fields make decisions differently. It is likely, therefore, that physicians also make decisions differently from laypeople. The second point was that determining emergency status is difficult. There are many studies that illustrate the complexity of determining "emergency" status, even among trained, onsite personnel. Therefore, the ability of gatekeeping physicians to determine emergency status over the telephone is open to question. Third, the perceived need for cost containment due to the expense for emergency services utilization is inaccurate. While the emergency department is viewed as being expensive, this assumption has been challenged by several studies indicating that emergency departments may actually deliver cost-effective care, even for non-urgent medical conditions. Finally, decreased utilization of emergency services has been shown to result in harm to patients who are refused authorization for emergency services. Managed care organizations perceive financial gain through decreased ED utilization. The strategies used have not resulted in the huge savings expected, and may be doing harm to their members. When one considers that onsite triage is less than ideal for determining the need for emergency services, and gatekeeping physicians are even less ideal, that costs are, in reality, not excessive, and methods used to decrease ED utilization are potentially harmful, the recent trend restricting emergency department may not make sense. The Prudent Layperson Standard is an attempt to rectify this situation. However, to implement this standard, methods by which "prudent laypeople" make decisions must be assessed. By comparing the decisions made by laypeople to those of emergency physicians, as triage representatives, and primary care physicians, as gatekeeper representatives, insight into their methods for decision making can be gained. This will have important implications regarding health care financing

policy, likely changing the means by which emergency visits are reviewed and paid by all health care plans.

Study Goal

The goal of this study was to perform a pilot study that compared the decision making among laypeople, emergency physicians, and primary care physicians on a set of clinical scenarios with potentially emergent conditions.

To achieve the project goal, the following objectives were pursued:

The primary objective was to assess the perceived urgency with which care should be sought for five potentially emergent clinical scenarios with a range of probabilities for poor outcomes, such as death or severe physical or neurological disability among the three groups. The secondary objectives were to assess location that care should be sought and the mode of transportation to the emergency department, if that was the location chosen, for each of the five scenarios among these groups. The secondary objectives were evaluated as if the scenario had occurred at two different times, one during regular office hours (2 PM), and the other in the middle of the night (2AM) to determine if the time of symptom onset affected medical decision making among these three groups.

Study Hypotheses

H_0: There is no statistically significant difference between the perceived urgency of care required for common potentially emergent conditions among three groups, laypeople, emergency physicians, and primary care physicians.

H_{A1}: There is a statistically significant difference between the perceived urgency of care required for a group of common potentially emergent conditions among at least one pair of the three groups, laypeople, emergency physicians, and primary care physicians.

H_{A2}: There is a statistically significant difference between the perceived urgency of care required for specific common potentially emergent conditions among at least one pair of the three groups, laypeople, emergency physicians, and primary care physicians.

Materials and Methods

Overview

This investigation evaluated how three groups perceive potentially emergent conditions. The study creates a starting point for establishing a definition of the Prudent Layperson Standard that can be applied by many stakeholders in medical care delivery, including emergency physicians, primary care physicians, health plans, and "prudent laypeople", the consumers of health care. This cross-sectional study uses a survey developed by the primary investigator to evaluate the level of medical care warranted for several hypothetical clinical scenarios. The following sections describe the research methods in detail:

1) Sample selection
2) Data collection
    a. Outcome measures
    b. Instrument
    c. Procedure
3) Data analysis and statistical considerations
4) Power calculation

1) Sample Selection

Emergency Physicians:

The working population for this group was all the active emergency physicians living in the Portland Tri-County area that includes Multnomah, Washington, and Clackamas counties. Active was defined as holding an active Oregon State medical license. The sampling frame was obtained using the November, 1998 Oregon Board of Medical Examiners (OBME) list of physicians licensed in the Oregon State who self-report their practice as emergency medicine[74, 75]. Duplicates were removed and emergency physicians holding inactive licenses were excluded from the analysis. For the second complete mailing (for mailing methods, see below), the non-respondents were cross-linked with the Oregon chapter of the American College of Emergency Physicians (ACEP) membership list and if the addresses were different (such as a home address), the new address was used for this mailing. Emergency physician surveys returned by the postal service for lack of a forwarding address were checked against the Oregon chapter of the American College of Emergency Physicians membership list for a different address and, if different, were sent another mailing. Those emergency physicians without a different address in the Oregon ACEP membership list whose surveys were returned by the postal service for lack of a forwarding address or were returned after the third mailing for lack of a forwarding address were excluded from analysis.

Primary Care Physicians:

The working population for this group were all the active physicians living in the Portland Tri-County area practicing in one of the five primary care fields: family practice, general practice, internal medicine, obstetrics and gynecology, or pediatrics. The sampling frame was obtained using the Oregon Board of Medical Examiners list of physicians licensed in Oregon State and included physicians self-reporting their practice as one of the five primary care fields with mailing addresses inside the Portland Tri-County area. Also excluded from the sampling frame were primary care physicians holding inactive licenses. Each primary care physician meeting the above criteria was assigned a random number generated by the database program (FilemakerPro 4.1, FileMaker Corp., CA) used for the mailing database. Finally, a random number was generated to determine the random number at which the sample selection would begin. The database was sorted by random number and, beginning at the generated beginning random number, the next 300 records were selected for inclusion in the study. Using this technique, a random selection of primary care physicians was generated. Primary care physician surveys returned by the postal service for lack of a forwarding address were excluded from final analysis. Finally, during the data extraction from the OBME database, ten physicians that did not fit the criteria were inadvertently included in the initial mailing. For analysis purposes, these physicians were excluded.

Laypeople:

The working population was the approximately 1.6 million people living in the Portland Tri-County area. The sample of laypeople was obtained by self-administered

surveys given to people in one of three settings: the Portland International Airport, a neighborhood drug store, and a popular open-air market. Three volunteer medical students from the Oregon Health Sciences University medical school were recruited to administer the surveys.

Where:

Portland International Airport (Portland, Multnomah County), a local drug store (Bi-Mart, Oregon City, Clackamas County), and an open air market (Portland Saturday Market, Portland, Multnomah County).

Why:

Adequate numbers of laypeople could have been recruited from any of the sites used. In order to get the most representative sample of laypeople in the Portland Tri-County region; sampling locations with different characteristics were selected.

Who:

Laypeople older than 18 years present in the locations being surveyed while the volunteers were administering the survey were eligible for participation. There was no restriction based on where the subjects lived. Therefore, an unknown proportion of the laypeople likely lived outside the Portland Tri-County area. People were approached and asked to participate in a health care survey about decision making. If the eligible person refused to participate, the volunteer approached the next eligible subject. When a subject agreed to participate, they were given a copy of the survey, a clipboard and a pen. The volunteers were available to clarify instructions and answer inquiries regarding how to answer the questions. Eligible respondents were required to speak and read English to participate due to an absence of translation services. The

volunteers attempted to arbitrarily select respondents, not targeting a specific age, sex or race for questions. They were responsible for monitoring the number of refusals to participate to give a general idea of the participation rate. It was not possible in the environments to strictly quantify those that refused to participate.

Training the Volunteers:

Each of the volunteers was trained regarding the expected method for administering the surveys. The volunteers were given a script to use when approaching potential participants (Appendix 1). In addition, each of the volunteers went through a practice survey administration with the primary investigator prior to approaching people in the survey locations.

2) Data Collection

a. Outcome Measures

The primary outcome variable was urgency regarding when care for each of the case scenarios (described below) should be sought ranging from "There is no hurry" to "I would seek care now." The two secondary outcome variables collected included the location care should be sought for each of the cases and, if the location chosen was the emergency department, what transportation should be used. The secondary outcome variables were assessed using two different times, 2PM and 2AM. The dependent variables were the three groups surveyed: laypeople, emergency physicians and primary care physicians.

b. Survey Instrument (Appendices 2-8)

Cover Letter (page 1):

A cover letter was included on the first page of each survey. There were three versions of the cover letter determined by the group to which the survey was delivered. In addition, each of the two physician groups had a different version of the cover letter for each of the complete mailings. All the cover letters included the departments and institution sponsoring the study, the methods for choosing subjects, the purpose of the study, details assuring confidentiality of responses, instructions on how and when to return the survey, and contact information for any questions. Information provided was limited to the general topic of medical decision making to avoid introducing bias.

Body of Instrument (pages 2 and 3):

The development of the body of the survey instrument was focused on gathering information to test the hypotheses. First, medical case scenarios were developed that were representative of typical emergency department cases of varying severity. For each case, the probability of outcomes of interest was calculated using computerized decision making tools and the five year mortality for each of these outcomes was determined using data collected while developing the Oregon Health Plan. The second step was to design questions about the cases that evaluated the perceived urgency associated with each of the cases. The third step was to develop a series of questions that determined where care should be sought for each case at two different times chosen to represent different health care system availability. The final step was to design a follow-up question for each

occasion that the respondent chose to go to the emergency department to ascertain appropriate method of transportation. The following sections detail the methods for each of these areas.

Case Scenarios:

Five case scenarios were developed in consultation with a practicing academic emergency physician (ADZ) to simulate common presenting complaints at an emergency department. Each case's target diagnoses were intended to be representative of a typical emergency department caseload, across a spectrum of severity, from low (most would agree that emergency care was not necessary) to high (most would agree that emergency care was appropriate).

After the initial medical problem to be simulated was determined, the diagnoses (cases 1, 2, 3, and 5) were entered into the Bayesian Calculator included in a computer-based diagnostic support tool (Iliad 4.5) to determine the posterior probability (*a posteriori* chance) for each diagnosis given a set of symptoms. The symptoms were adjusted using this process to create a specific probability for each target diagnosis. These same symptoms were then entered into the consultation portion of Iliad and a differential diagnosis was obtained for these symptoms[76-78]. The percentages for the differential diagnoses do not necessarily add to 100% because there is overlap among the diagnoses and there are also many that have a less than one percent probability that are not listed in the text below.

Finally, using data collected while creating the Oregon Health Plan, the 5-year chance of death with and without intervention was determined for each of the diagnoses in the differential determined above. It was expected that the short-term mortality

likelihood with and without treatment would parallel the Oregon Health Plan five-year mortality likelihood. Case one is included below followed by the Bayesean probabilities, the differential diagnosis for the symptom complex, and the 5-year mortality data from the Oregon Health Plan (cases two, three and five are included in Appendix 9):

Case 1: "Imagine a 47-year-old overweight man who smokes and has a history of sugar diabetes. He begins to have pain in the middle of his chest without exercise that is sharp and radiates to his jaw. How soon would you seek medical care for him?"

The target diagnosis was acute myocardial infarction. The following were the characteristics entered into the Bayesean calculator: age 47, sex male, 30% above ideal body weight, history of diabetes mellitus, history of smoking, sudden onset of pain, pain at rest, pain located under the sternum, the pain is sharp in nature, and the pain radiates into the patient's jaw. The calculated *a posteriori* probability that this patient is having an acute myocardial infarction is 0.56. Entering the data into the consultation portion of Iliad 4.5 revealed that there was a 53% chance that the diagnosis was acute myocardial infarction, a 49% chance that the diagnosis was unstable angina, a 14% chance that the diagnosis was ischemic cardiomyopathy, and a 1% chance that the diagnosis could be pulmonary embolism or stroke. All other diagnoses had a less than one percent probability. According to the data collected for the Oregon Health Plan, five year mortality with and without treatment are as follows: acute myocardial infarction – 10% and 30%, unstable angina – 12% and 30%, ischemic cardiomyopathy – 30% and 100%, Pulmonary embolism – 60% and 80%, and stroke – 10% and 30%.

For the case of an ankle injury, Bayesean probabilities were not available in Iliad 4.5. Because orthopedic problems are common reasons to seek emergency department care, another means of determining the probability for an ankle fracture needed to be developed. The means used to develop this probability was to use the probabilities used to develop the Ottowa Ankle Rules by Stiell et al[79-86]. The probabilities they calculated when trying to determine the need for ankle films based on the likelihood of a underlying fracture in the presence of distinct clinical findings should closely parallel the probabilities that the ankle was actually fractured.

Case 4: "Imagine an 18-year-old female high school student. While running across a field, she steps in a gopher hole and twists her ankle. She is in a great deal of pain but is able to put weight on it. How soon would you seek medical care for her?"

The target diagnosis was ankle fracture. Using data from the Ottawa Ankle Rules' recursive partitioning model, this case would have a 3% chance of actually being an ankle fracture[79-86]. Other potential diagnoses include ankle sprain and torn tendon. Since the injury is closed, according to the data collected for the Oregon Health Plan, five year mortality with and without treatment are as follows: ankle fracture – 0.5% and 20%, a torn tendon – 0% and 0%, ankle sprain (closed) - 0.01% and 0.1%[1].

[1] Mortality may be low, but morbidity (dysfunctionality) may be substantial. Furthermore, the data collected by the Oregon Health Plan did not specifically address ankle fracture; rather it addressed lower extremity fracture below the knee.

Questions

Instructions

Prior to the questions on each page were instructions detailing proper completion of the survey instrument by participants. Key points in the instructions were the assumptions that each of the case patients had health insurance and a regular physician. Furthermore, for the questions on page three, the respondents were asked to take the time indicated in the question into account when responding. The questions in the body of the survey were designed to address the outcome measures. Page two addressed urgency using a visual analog scale, and page three addressed location and transportation to the ED using multiple-choice questions.

Urgency (page 2):

The first page of questions was designed to measure urgency. Following each case simulation, a100mm long visual analog scale was used in order to collect 100 possible data points for each case. The scale was placed below each case scenario. The following is a sample of the scale used:

Figure 1 **Visual Analog Scale**

Location of Care (page 3 top)

The questions in this section were designed to assess location of care the respondents thought appropriate for each case scenario at two times, 2PM and at 2AM. Each of the question pairs was placed side by side. On the left, the question asked that the respondent imagine that the case occurred at 2 PM and, on the right, the question asked that the respondent imagine that the case occurred at 2 AM. The list of choices was the same for each case and time period: "A. He/She does not need to be seen", "B. He/She should call or see his/her regular doctor", and "C. He/She should go to an emergency room now." These questions were designed to determine where the respondent believed the person in each case should seek care at two distinct times, the first during regular office hours and the second in the middle of the night when most care sites are closed. There are other differences between these times as well including increased uncertainty associated with the middle of the night in an affective sense, particularly on the weekends.

Transportation Mode to the Emergency Department (page 3 bottom)

The second group of questions on page three was designed to obtain information regarding mode of transportation warranted for each case the respondent had indicated emergency care was needed in the location of care questions. The respondents were asked to indicate the mode of transportation they felt was appropriate. Choices include: "Walk or public transport", "Call a cab", "Drive yourself", "Have someone else drive you", and "Call 911 for an ambulance." Times corresponding to those used for the questions about location were used for this set of questions. The table of questions was

designed to further understand the level of transportation the respondents felt was needed for the cases they indicated should "go to the emergency room now".

Demographic Information (page 4 top)

This information was collected to determine whether the sample collected was representative of the general populations for each of the groups. The data were also used to exclude respondents that did not meet inclusion criteria.

Gender and year of birth data were collected by the surveys from all three groups. Demographic information specific to each of the three populations was also collected.

Physicians:

Demographic information collected for all physicians included last year completed in each training program in which formal training was pursued, board certification status in all fields trained (or not trained in the case of those "grand-fathered" into emergency medicine), and percent of time spent in all clinical and non-clinical work broken down by area in which work is performed.

Emergency Medicine Physicians:

Demographic information specific to emergency physicians added to the surveys included primary practice setting, and annual patient volume seen at that setting.

Primary Care Physicians:

Demographic information specific to primary care physicians added to the surveys included prior emergency department experience, gatekeeper status for emergency care, number of emergency department visits authorized per month, and, if currently working an emergency department setting, the primary emergency medicine practice setting and the patient volume at that setting.

Layperson:

Demographic information specific to the layperson survey instrument included level of education (wording for this question was drawn from the 1990 US census survey), history of emergency medical treatment, history of hospitalization, whether they work in health care (if so, list their occupation), whether they have a primary care physician, whether they have medical insurance and if so, do they have a co-payment, presence of chronic medical problems and, if present, what types, and number of visits to a doctor in last year for personal medical care.

Importance of Issue (page 4)

The last question on the survey was an attempt to determine importance of the Prudent Layperson Standard issue to the three populations studied. The question asked the respondents to indicate their closest agreement with one of four statements regarding when medical insurance should pay for emergency department use (see Appendices 2-8).

Survey Validation

Content validity was assessed in three steps. The first step involved feedback from emergency physicians in active practice at Oregon Health Sciences University. This allowed for clarification of the case scenarios and multiple-choice questions. The second step of content validation was obtained using a group of public health peers in a structured research review environment. The final step, feedback from thesis advisory committee members, helped to remove any remaining clarification issues.

Pilot testing of the survey instrument was conducted with two small groups of respondents; one group included five emergency physicians from OHSU and the other group used six laypeople from Washington County, OR. This allowed for final testing of the instrument prior to distribution to the study populations. The focus of this stage was to eliminate typographical errors, asses appropriateness of the vocabulary, clarity of instructions, and flow of the survey. In addition, a primary care physician was consulted regarding appropriateness, clarity and flow of the survey.

The questions regarding location of care and mode of transportation to the ED were expected to parallel the questions regarding urgency. Strong collinearity was expected among these three sets of questions. If low collinearity were found between the questions, internal consistency of the survey would have been called into doubt.

c. Survey Procedure

Emergency Physicians and Primary Care Physicians

Mailing One:

The survey instrument was mailed to the physician populations defined. Also included in the mailing was a cover letter briefly describing the study including some background information. The cover letter was printed on the outside cover of the survey instrument and was directed to the appropriate physician group surveyed (appendices 2-8). Included in all mailings was a business reply envelope with return postage and the response address printed on the front.

Mailing Two:

Two weeks after the initial mailing, a reminder postcard was sent to all non-respondents. The addresses used for this mailing were the same as those used for the initial mailing.

Mailing Three:

Two weeks following the postcard reminder (four weeks after the Mailing One) another complete mailing was sent to those that had not yet responded. A modified cover letter was used for the third mailing, which placed added emphasis on the importance of the respondent's participation. The addresses used for this mailing were the same as those used in the initial mailing for the primary care physicians. For emergency physicians, the addresses of the non-respondents (from the OBME database) were compared to the addresses listed in the Oregon ACEP database, and, if different, the

Oregon ACEP address was used for this mailing, otherwise no change was made to the mailing address.

Response rates for each of these populations were expected to be high because they are both specialized populations that would likely be interested in the survey's topic. According to Rea et al, response rates in interested populations usually range between 65-90%[87]. To obtain a sample size of 100 for each of the physician groups, it was estimated that between 112 and 15 surveys must be mailed to each physician group. For this study, 300 surveys were initially mailed to primary care physicians, and surveys were mailed to every qualifying emergency physician (191) due to the limited numbers available in the Portland Tri-county area.

Laypeople

Laypeople were approached by the medical student volunteers as outlined above in "Sample Selection". After the respondent completed the survey, the volunteers collected and briefly ascertained that the surveys were complete and correctly filled out before the respondent left. The respondents were asked to give answers to any blanks that they had left on the forms. The sample collection continued until greater then 150 surveys were completed.

Volunteers were trained according to these guidelines prior to administering the survey. They were also provided with a letter from the Department Chair of the Department of Public Health endorsing them and their survey recruitment efforts (Appendix 10). Finally, at the completion of the survey, the respondent layperson was

offered a one-page description of the Prudent Layperson Standard for educational purposes (Appendix 11).

Data Handling

Coding

All the non-numerical data were machine coded for data entry. A database (FilemakerPro 4.1, FilemakerPro Corp.) was used to interpret the answers given and generated a file that was appropriately coded for statistical analysis (Appendix 12).

Data Entry

As surveys were returned, the data were entered into the database using the survey form that corresponded to the respondent's classification: layperson, primary care physician or emergency medicine physician. Double data entry was performed to ensure accurate data entry. The data were exported from this database in tab-delimited form and imported into StatView 5.0 (SAS Institute, Inc. 1998).

Confidentiality

Identifiers were placed on all envelopes in order to track response rates and to easily identify those physicians that required the second and third mailings. The data, once entered into the database, had no identifying codes and no effort was made to correlate the response data with the respondent databases. The database was compressed and encrypted using standard utility software (Stuffit Deluxe 5.1, Aladdin Systems, Inc., 1999) into a password-protected file. The room in which the computer used for data

entry was locked at all times with restricted card-key access. A backup copy of the data was maintained on a Jaz disk kept in a locked drawer in the same room as the computer.

3) Data analysis and statistical considerations.

Overall Decision Making Differences Using Urgency Data:

Initial analysis was performed using the data obtained from the visual analog scale. It would be difficult to determine if the descriptive data or the ANOVA analyses regarding urgency differ in aggregate among the different decision-makers. In order to evaluate these differences, a one way multivariate analysis of variance (MANOVA) was used. A Wilks' Lambda test was used to determine significance. This test helped determine if there was an overall difference among the three groups regarding how they responded using all the cases in aggregate. Significance was set at alpha equal to 0.05. If differences were found, a step-wise MANOVA, checking between each pair of groups, was run to determine how the groups were different. For this test, an alpha of 0.05/3 was used to determine significance. This series of tests was useful to reveal two important aspects of the decision making process; 1) overall differences among the three groups in aggregate, and 2) the overall differences between each of the groups in pairs. The results of this analysis were useful to determine if the primary hypothesis was supported by the data.

Urgency Related Visual Analog Scale Inter-Case Analysis:

The data obtained from the visual analog scales were used to calculate the means and standard deviations for each case scenario subdivided into respondent group. In addition, the median, minimum and maximum was calculated for each group and each case.

Following the analysis of the descriptive data, a parametric analysis of variance (ANOVA) was performed for each case comparing the three groups for differences regarding their choices. Significance was set at alpha equal to 0.05. If there was a difference, a Bonferroni test was performed to determine where the differences lie among the three groups. In order to maintain the same significance threshold, the Bonferroni test requires that the desired alpha be divided by the number of comparisons being made, in this case 0.05/3.

Location and Mode of Transportation Analysis:

For each of the cases, proportions were calculated to describe where each group chose to get care, and if the ED was chosen, what mode of transportation should be used for each case at both time periods. The percentage breakdown was used as preliminary support for differences among the groups for each case. There should also be some preliminary evidence to support or refute that decision making regarding location or mode of transportation in those that were to go to the ED is different among the three groups. The next step was to perform a non-parametric ANOVA (Kruskal-Wallis) to determine those groups that had significant inter-group differences in choices for location for care.

Time Related Intra-Case Analysis:

The next part of the analysis was to determine if time of day affected medical decision making among the groups. A Wilcoxon Rank Sum was performed to determine if there were any differences in decision making among the groups for each case comparing time. The analysis was split by group.

Descriptive Statistics and Further Analysis

Correlation Matrix:

A correlation matrix was generated for all the questions in the body of the survey instrument. In addition, a Fisher's r to z test was performed to determine if the correlation was significant. The purpose of the matrix was to determine if there was a strong relation between related questions. A positive correlation between all the different questions about case one would support that there was internal consistency for that case. A negative correlation would indicate an inverse relationship. Finally, any non-significant p-values provided by the Fisher's r to z test would support a non-significant relationship among the questions.

Demographic Analysis:

Descriptive statistics, specifically percentages in each category, were generated to compare the demographic variables to those expected in the appropriate general population for each group. These were tabulated with the expected values when appropriate.

Importance of Issue

The final question on the survey was designed to validate that the Prudent Layperson Standard is an important issue. The data were tabulated and a Kruskal-Wallis test was performed on the data to determine if there were significant differences among groups. Finally, a Mann-Whitney U test was performed on each pair of groups to determine between which groups differences lay.

3) Power calculation.

A power calculation was performed using data from a small pilot study of six laypeople and five emergency physicians. Three sets of power calculations were performed. For the purposes of this study, the visual analog scale representing urgency of the medical problem was the primary dependent variable. Power analysis was also performed on the two sets of ordinal data representing location medical care should be sought and mode of transportation if going to the ED. The pilot data for the primary care physicians were not collected due to the difficulty obtaining a small sample of each of the five fields that are defined as primary care specialties. It is unlikely that the primary care physician pilot data would have changed the overall power calculation by a significant amount.

The next step was to calculate a global standard deviation for the pilot study groups. This was done by choosing the largest standard deviation from each group and using the following formula:

$$(n_1-1)s_1^2+(n_2-1)s_2^2/(n_1+n_2-2) = S_p^2$$

The test used to determine sample size was the t-test. For each of the variables, an effect size (E) of 20% was chosen. Then the standardized effect size was calculated using the following formula: E/ S_p. The result of this calculation was rounded down to the nearest standardized effect size in the t-test sample size table to err on the side of a larger number of subjects required. The desired alpha for the two-tailed t-test was 0.05. In addition, for the questions that attempted to explore the effect of time on where care should be sought, the data were non-parametric. In the tables for the sample sizes for these two questions, a 50% correction factor was added to increase the likelihood that the sample size was adequate. Finally, sample size was also calculated for these two groups of questions using the assumption that the data would be binary. For this, a chi-squared test was used to determine sample size.

Means and standard deviations for the visual analog questions for each case using pilot data:

	Laypeople		Emergency Physicians	
	Mean	S.D.	Mean	S.D.
Case 1	96	3.03315	86.3	25.0181
Case 2	44	17.87736	71.3	4.60848
Case 3	54.7	45.3637	61.7	19.31937
Case 4	65.2	38.7887	26.7	32.80099
Case 5	95.8	2.92689	95.1	5.4292

$S_p = 39.016$

Table 1 Means and standard deviations for the urgency questions using the pilot data

The sample size required from each group is as follows:

	Power		
E/ S_p.	95%	90%	80%
0.513 (E=20%)	104	84	63
0.256 (E=10%)	416	336	251

Table 2 Sample sizes required for the urgency questions using the pilot data

Means and standard deviations for the location of care at 2PM questions for each case

	Laypeople		Emergency Physicians	
	Mean	S.D.	Mean	S.D.
Case 1	3.3	1.505545	4.1	1.069045
Case 2	1.7	0.516398	2.2	0.755929
Case 3	2	0	2	0.0
Case 4	2.3	0.816497	2.1	1.345185
Case 5	3.5	1.224745	4.7	0.487950

$S_p = 1.420$

Table 3 Means and standard deviations for the location questions using the pilot data

The sample size is as follows:

	Power		
E/ S_p.	95%	90%	80%
0.704 (E=20%)	53	43	32
50% Correction	80	65	48
0.352 (E=10%)	289	234	174
50% Correction	434	351	261

Table 4 Sample sizes required for the location questions using the pilot data

Means and standard deviations for the location of care at 2 AM questions for each case

	Laypeople		Emergency Physicians	
	Mean	S.D.	Mean	S.D.
Case 1	4.5	0.547723	4.4	0.534522
Case 2	1.5	0.547723	3.6	1.133893
Case 3	2.5	1.224745	2.7	1.253566
Case 4	2.8	1.329160	1.4	1.133893
Case 5	4.5	0.547723	4.7	0.487950

$S_p = 1.288$

Table 5 Means and standard deviations for the mode of transportation questions using the pilot data

The sample size is as follows:

	Power		
E/ S_p.	95%	90%	80%
0.776 (E=20%)	53	43	32
50% Correction	80	65	48
0.388 (E=10%)	289	234	174
50% Correction	434	351	261

Table 6 Sample sizes required for the mode of transportation questions using the pilot data

In order to obtain 95% power for the primary dependent variable, 104 respondents are required from each group. To obtain 80% power, 63 respondents are required to differentiate an effect size of 20%. The sample size required to detect an effect size of 10% was also calculated, but this effect size only has meaning when applied to the data collected using the visual analog scale. Therefore, the visual analog data are the data used to calculate the sample sizes to reveal a 10% effect size. In order to obtain 95% power for the primary dependent variable, 416 respondents are required from each group. To obtain 80% power, 251 respondents are required to differentiate an effect size of 10%.

Because the location and mode of transportation group of questions contain non-parametric data, a second method of determining sample sizes was used, the two proportions chi-squared sample size calculation. Alpha was set at 0.05 and the power was set at 80%. Using p=0.5 as the worse case scenario and several effect sizes, the following table was derived:

Effect Size	Alpha	Sample Size Required
0.1	0.1	309
0.1	0.05	392
0.1	0.01	583
0.15	0.1	137
0.15	0.05	174
0.15	0.01	259
0.2	0.1	77
0.2	0.05	97
0.2	0.01	145

Table 7 Two proportions chi-squared sample sizes

Using an effect size of 20% for the non-parametric data is the smallest that is meaningful for the limited number of data points. Therefore, at an alpha of 0.05 the required number of subjects in each group is 97. Since 63 respondents are required to obtain the same power with the same effect size using the visual analog data, 100 respondents from each group should be adequate.

Human Subjects

All subjects involved in this study were given opinion surveys that were filled out on a voluntary basis. All data collected for this study were kept confidential as outlined above in the Survey Procedure section. There was no clinical contact with any of the subjects involved in this study. This survey and the method of proposed contact of the subjects were exempted from review by OHSU institutional IRB prior to initial subject contact.

Results

Response Rate

There were 191 emergency physicians listed in the Oregon Board of Medical Examiners (OBME) database that had addresses listed in the Portland Tri-county area. Five envelopes were returned because the addresses used for the mailing were incorrect. These five were removed from the calculated response rate. The total response rate for emergency physicians was 54% (100/186).

Three hundred primary care physicians were included in the initial mailing, selected as described in the methods. Inadvertently, eight surveys were sent to specialists and were excluded from analysis (Five were infectious disease specialists, two were pediatric cardiologists and one was a pediatric endocrinologist). Thirteen envelopes were returned because the addresses used for the mailing were incorrect. These 13 were also removed from the analysis. The overall response rate for primary care physicians was 44%(123/279). The following table summarizes the response for each mailing.

	Mailing One	Mailing Two	Mailing Three	Total
Emergency Physicians	27% (50/186)	8% (14/186)	19% (36/186)	54% (100/186)
Primary Care Physicians	27% (76/279)	5% (15/279)	11% (32/279)	44% (123/279)

Table 8 Response rate for the physician groups

From the three locations the layperson version of the surveys was administered, there were 165 respondents. Seventy-nine responses collected from the airport, 31 collected from the drug store, and 55 collected from the open-air market. Calculating a response rate was not possible due to the nature of the public areas in which the surveys

were distributed. However, the volunteers made response rate estimates for each of the survey sites. The airport response rate was between 20 – 25%, the drug store response rate was between 15 - 17%, and the open-air market response rate was between 25 – 33%. Nonparticipants tended to be in a rush (walking fast, reading as they walked or no eye contact), those that were busy (people with kids, or holding shopping lists), and those that did not speak or write English. The volunteers also noted that middle aged and elderly people (≥40) more frequently refused to participate than the younger age groups (≤30).

Demographics

The demographic variables were summarized by group. The first group was laypeople. The surveys were completed by more men (54.3%) than women (45.7%). The following table presents the layperson sample's age compared to the Portland Tri-County expected (Oregon State Census 1996-98):

	Laypeople Survey	**Expected in Portland Tri-county**
Age Groups		
18-24	17.5% (27/154)	12%
25-44	43.5% (67/154)	43.6%
45-64	31.2% (48/154)	28.9%
65+	7.8% (12/154)	15.5%
Education		
Less than high school Diploma	20.2% (33/163)	15-24%
High school diploma and no post secondary degrees	33.1% (54/163)	57-59%
Bachelor's degree or greater	46.6% (76/163)	19-26%
Personal Medical Insurance		
No	9% (15/162)	10-15%
Yes	90.7%(147/162)	85-90%

Table 9 Demographic variables from layperson surveys compared to expected values for the Portland Tri-County area

The following tables summarize the rest of the demographic variables collected about laypeople:

	No	Yes
Ever been to the ED?	20.1%	79.9%
Ever been hospitalized?	36%	64%
Work in health care field?	89%	11%
Have a primary care physician	18.3%	81.7%
Co-payment with health care visits?	27.3%	72.7%
Chronic medical problem?	76.5%	23.5%

Table 10 Health care related demographic variables

Number of visits to primary care physician last year	Percent
None	18.1% (29/160)
1-2	44.4% (71/160)
3-5	24.4% (39/160)
6-10	6.3% (10/160)
>10	6.9% (11/160)

Table 11 Number of visits to the respondent's primary care physician in the last year

The demographic variable collected about the two physician groups are summarized in the following table:

	Emergency Physicians	Primary Care Physicians
Gender (%)		
Male	75.8% (75/99)	50% (61/122)
Female	24% (24/99)	50% (61/122)
Age Groups (%)		
18-24	0%	0%
25-44	45.4% (44/97)	52.1% (63/121)
45-64	54.6% (53/97)	40.5% (49/121)
65+	0	7.4% (9/121)
Training		
Family Practice	3	25
Internal Medicine	8	52
Obstetrics/Gynecology	0	8
Pediatrics	1	22
Emergency Medicine	68	0
Other	4	4
Unknown	16	0
Board Certified or Eligible?		
Family Practice	2	22
Internal Medicine	9	56
Obstetrics/Gynecology	0	10
Pediatrics	1	27
Emergency Medicine	88	1
Other	1	2
Unknown	1	0
ED Type (%)		
Tertiary care medical center	37% (37/100)	57.1% (4/7)
Large community hospital	34% (34/100)	0
Public hospital	0%	0
Small community hospital	21% (21/100)	14.3% (1/7)
Urgent care	5% (5/100)	28.6% (2/7)
Retired/not currently practicing	2% (2/100)	0
Other	1% (1/100)	0
Annual ED Volume (%)		
0 - 5,000	1% (1/98)	14.3% (1/7)
5,001 – 10,000	1% (1/98)	14.3% (1/7)
10,001 – 25,000	25.5% (25/98)	14.3% (1/7)
25,001 – 50,000	56.1% (55/98)	42.8% (3/7)
50,001 – 100,000	15.3% (15/99)	14.3% (1/7)
>100,000	1% (1/98)	0

Table 12 Demographic variables for each of the physician groups

The following tables apply only to primary care physicians:

	No	Yes
Prior ED Experience other than training	60.3% (73/121)	39.7% (48/121)
Need to approve ED visits for reimbursement?	35.9% (42/117)	64.1% (75/117)

Table 13 Demographic variables specific to primary care physicians

For those primary care physicians that were required to be consulted for approval prior to both going to the ED and for reimbursement for the visit, the mean number of approvals per month was 11.3 (SD 15.27).

Correlation Matrix

As part of the validation of the survey instrument, correlation matrices were calculated to determine if the visual analog scale urgency results correlated with the results from the multiple choice location and transportation questions. Both questions were designed to have higher values represent increased urgency or higher level of location of care/mode of transport. All the correlation coefficients were positive and all were significant to ≤ 0.05 with the exception of three correlations. All three of the non-significant correlations by the Fischer's r to z test were between the visual analog scale and the mode of transportation used at 2PM. The non-significant correlations were the ankle injury and GI bleed cases for the emergency physician group ($p = 0.5864$) and GI bleed case for the laypeople group ($p = 0.1015$).

Urgency

The initial phase of the analysis was to evaluate the perceived urgency for all five cases among the three groups. This analysis was performed using a MANOVA on the continuous visual analog data. The result of the Wilks' Lambda was significant ($p<0.0001$) indicating that there were differences in the overall decision-making among

the three groups. Where the differences lie was clarified using a step-wise MANOVA, checking between each pair of groups, for the visual analog data. The Wilk's Lambda remained significant ($p<0.0001$) for all three multiple comparisons.

The means and standard deviations were calculated for each of the visual analog questions. These questions were answered by drawing a line on the following scale:

Figure 2 **Visual analog scale**

The following table summarizes the findings:

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing	Variance	Range	Median
Chest Pain, Total	94.36	9.38	.48	379	11	99	9	88.03	88	98
Chest Pain, EM	98.03	2.31	.23	97	80	99	3	5.34	19	99
Chest Pain, PCP	96.55	5.19	.48	119	65	99	4	26.94	34	99
Chest Pain, L	90.57	12.51	.98	163	11	99	2	156.58	88	95
Headache, Total	75.22	25.95	1.34	375	0	99	13	673.52	99	85
Headache, EM	93.49	13.15	1.34	97	28	99	3	172.88	71	99
Headache, PCP	78.41	20.78	1.93	116	16	99	7	431.72	83	84
Headache, L	61.99	27.72	2.18	162	0	99	3	768.41	99	62
Fever, Total	53.89	29.74	1.53	376	0	99	12	884.28	99	53
Fever, EM	58.86	26.78	2.72	97	0	99	3	717.42	99	61
Fever, PCP	51.18	27.82	2.57	117	0	99	6	773.94	99	50
Fever, PL	52.88	32.45	2.55	162	0	99	3	1053.04	99	53
Ankle Pain, Total	37.33	29.56	1.52	379	0	99	9	873.67	99	29
Ankle Pain, EM	31.11	27.25	2.77	97	0	99	3	742.54	99	25
Ankle Pain, PCP	36.76	27.64	2.53	119	0	99	4	764.22	99	33
Ankle Pain, L	41.44	31.65	2.48	163	0	99	2	1001.5	99	32
GI Bleed, Total	93.01	11.53	.59	378	11	99	10	132.85	88	98
GI Bleed, EM	97.89	2.43	.25	97	83	99	3	5.89	16	99
GI Bleed, PCP	96.43	4.98	.46	118	66	99	5	24.85	33	99
GI Bleed, L	87.63	15.36	1.2	163	11	99	2	235.78	88	93

Table 14 Descriptive statistics for each case scenario split by group. The range of values was from 0 ("There is no hurry) to 99 ("I would seek care now"). (Each of the cases above refers to the cases in the survey. EM = emergency physician, PCP = primary care physician, and L = layperson.)

With the exception of the ankle injury case, emergency physicians consistently felt that that the urgency for the scenarios was higher than the other two groups. This is illustrated in the following graph:

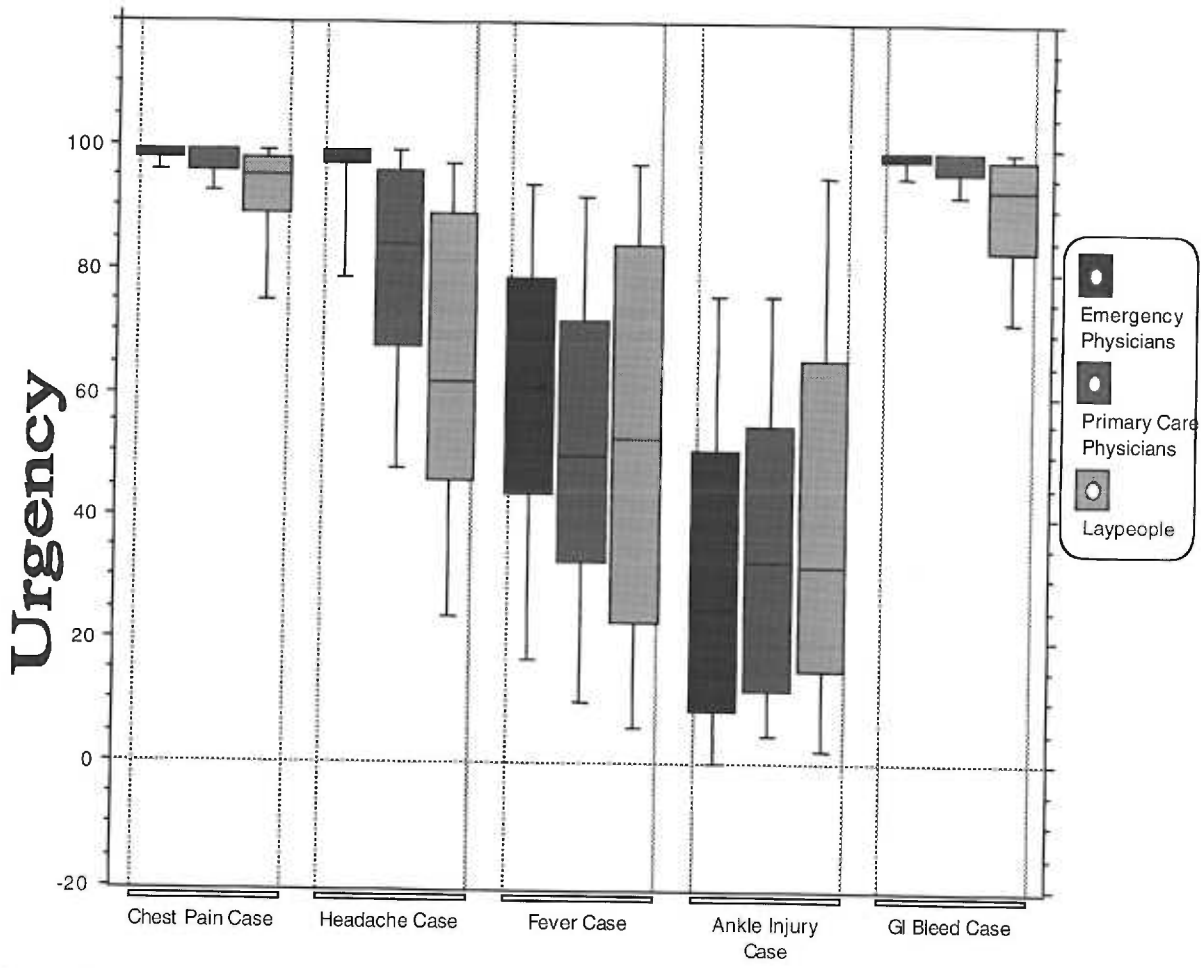

Figure 3 Box plot of the means and standard deviations of each case split by group (Each of the cases above refers to the cases in the survey. VA = visual analog scale. EM = emergency physician, PCP = primary care physician, and PL = layperson.)

The raw data suggest that the decisions made by physicians differ from those made by laypeople. The graph above illustrates the trend that emergency physicians sense increased urgency for all the cases except the ankle injury. An ANOVA was performed for each of the cases followed by a Bonferroni post-hoc test to evaluate any inter-group differences. The ANOVA revealed that there were significant inter-group differences for the chest pain, headache, ankle injury, and GI bleed cases (Appendix 13). The Bonferroni post-hoc test further revealed the inter-group differences. The following table summarizes the differences found:

	Chest Pain Case p-Value	Headache Case p-value	Fever Case p-value	Ankle Injury Case p-value	GI Bleed Case p-value
EM, PCP**	0.2110	<0.0001*	0.0998	0.1834	0.3087
EM, PL**	<0.0001*	<0.0001*	0.1369	0.0043*	<0.0001*
PCP, PL**	<0.0001*	<0.0001*	0.7667	0.1310	<0.0001*

*Significant to <0.0167 (0.05/3)
**EM = emergency physician, PCP = primary care physician, and PL = layperson.

Table 15 Bonferroni post-hoc analysis between groups for each case

Location of Care

The next stage of the analysis evaluated the decisions made regarding where the people in each case should be seen: either the person did not need to be seen, the person should go or call their regular doctor or the person should go to the emergency room immediately. The following graph breaks the percentages for each response down by group for each case:

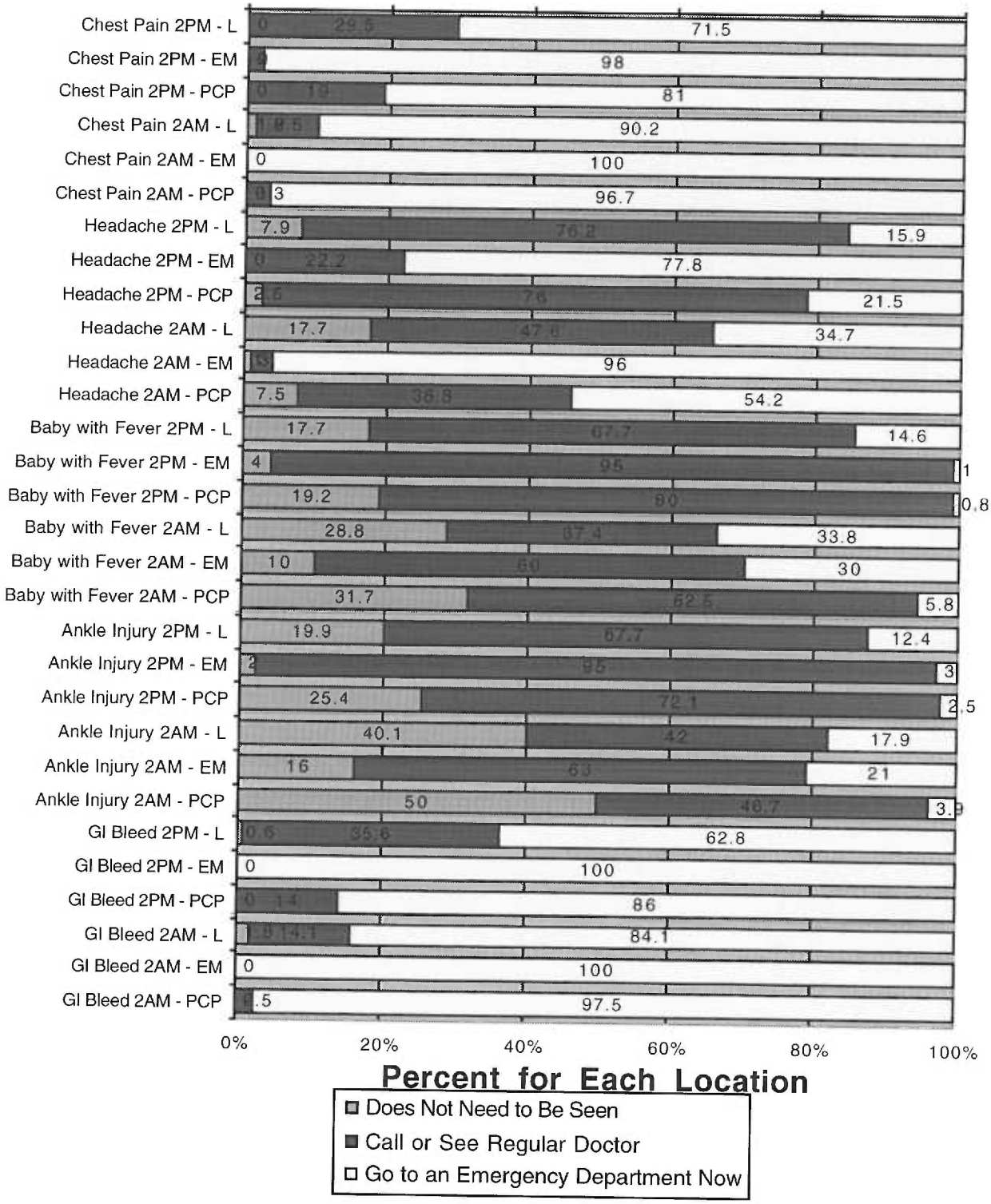

Figure 4 **Each bar on the graph represents a combination of case and respondent group. The bar is divided into three sections representing the choices available for location of care broken down by percentages (L = Layperson, EM = Emergency Physician, PCP = Primary Care Physician).**

Kruskal-Wallis tests were performed to test the hypothesis that there were no differences among the groups regarding location of care. The following table summarizes the results:

	p-value
Chest Pain Case – 2 PM	0.0009*
Headache Case – 2 PM	<0.0001*
Baby with Fever Case – 2 PM	0.1011
Ankle Injury Case – 2 PM	0.0144*
GI Bleed Case – 2 PM	<0.0001*
Chest Pain Case – 2 AM	0.3742
Headache Case – 2 AM	<0.0001*
Baby with Fever Case – 2 AM	<0.0001*
Ankle Injury Case – 2 AM	<0.0001*
GI Bleed Case – 2 AM	0.0474*

*Significant to <0.05

Table 16 Kruskal-Wallis Tests for each case and time analyzing location of care

Mode of Transportation to the Emergency Department

After evaluating where the respondent chose for the case patients to obtain care, they were asked to determine how those patients that should go the emergency department should get there. The following graph is useful to quickly evaluate trends:

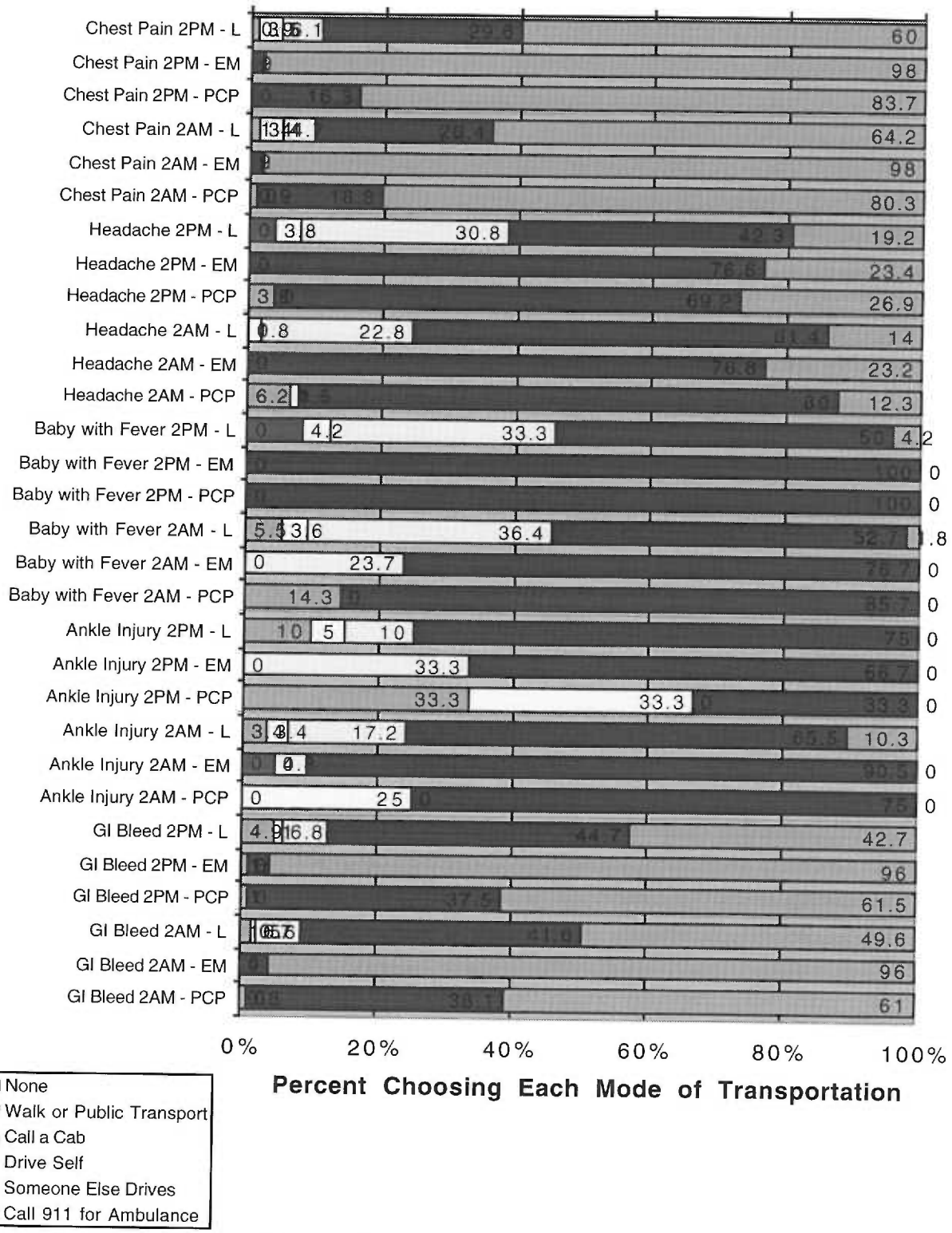

Figure 5 **Each bar on the graph represents a combination of case and respondent group. The bar is divided into three sections representing the choices available for location of care broken down by percentages (L = Layperson, EM = Emergency Physician, PCP = Primary Care Physician).**

Kruskal-Wallis tests were performed to test the hypothesis that there were no differences among groups regarding the mode of transportation chosen when emergency care was determined to be needed. The following table summarizes the results:

	p-value
Chest Pain Case – 2 PM	<0.0001*
Headache Case – 2 PM	0.0345*
Baby with Fever Case – 2 PM	0.6294
Ankle Injury Case – 2 PM	0.4155
GI Bleed Case – 2 PM	<0.0001*
Chest Pain Case – 2 AM	<0.0001*
Headache Case – 2 AM	0.0115*
Baby with Fever Case – 2 AM	0.1737
Ankle Injury Case – 2 AM	0.8708
GI Bleed Case – 2 AM	<0.0001*

*Significant to <0.05

Table 17 Kruskal-Wallis Tests for each case and time analyzing mode of transportation

Influence of Time of Day on Medical Decision-Making

It was important to assess whether time affected medical decision making for each case and whether group membership was a significant factor. The following table presents the p-values determined by the Wilcoxon Signed Rank Test over all cases, then broken down by group membership. The table is broken into two sections, the first listing the data comparing locations, and the second comparing the mode of transport.

2PM vs. 2AM	Overall	Laypeople	Emergency Physicians	Primary Care Physicians
Location				
Chest Pain Case	<0.0001*	<0.0001*	0.1797	0.0001*
Headache Case	<0.0001*	0.0703	0.0006*	<0.0001*
Baby with Fever Case	0.0262*	0.1277	0.0007*	0.0853
Ankle Injury Case	0.0002*	0.0074*	0.5372	<0.0001*
GI Bleed Case	<0.0001*	<0.0001*	**	0.0021*
Mode of Transport				
Chest Pain Case	0.0396*	0.1138	**	0.1088
Headache Case	0.0382*	0.3613	0.0679	**
Baby with Fever Case	0.4227	**	**	0.4227
Ankle Injury Case	**	**	**	**
GI Bleed Case	0.0080*	0.0110*	**	0.4185

* Significant to <0.05

** Not enough observations to compute this result[2]

Table 18 Wilcoxon Signed Rank Test analyzing time influencing decision making

Importance of Issue

At the end of the survey, all three respondent groups were asked a question to assess how important this issue was from each group's perspective. The question specifically asked the respondent to choose how their emergency care should be paid. The following table summarizes the responses to "My insurance should pay for every visit I make to an emergency department…":

Response Choices	Laypeople	Emergency physicians	Primary care physicians
…whether an emergency or not	23.3%	6%	0%
…for conditions that an average person would consider an emergency	52%	93%	61.2%
…for visits that my regular doctor authorizes	8.7%	0%	28.1%
…for conditions, that after being evaluated, actually were emergencies	16%	1%	10.7%

Table 19 Percent selecting each of the response categories by group

These percentages suggest differences among the three groups. Applying a Kruskal-Wallis test to responses to this question revealed that there was a significant difference ($p<0.0001$) among respondent groups. A Mann-Whitney U test was performed on each of the three pairs of groups to determine where the significant differences lie regarding the importance of this issue. The following table summarizes the results:

Groups Compared	p-value
Laypeople and Emergency Physicians	0.5032
Laypeople and Primary Care Physicians	0.0004*
Emergency and Primary Care Physicians	<0.0001*

Table 20 Mann-Whitney U test results comparing the group pairs regarding the importance of the issue.

[2] The Wilcoxon Signed Rank Test requires that there be different values between the two compared values to be used in calculating the p value. If there is perfect correlation, there will be no data points available for the test to use for the calculation.

Discussion

The purpose of this study was to compare the medical decision making among laypeople, emergency physicians, and primary care physicians in a pilot study. The survey instrument was designed to address this issue using five clinical scenarios developed to represent common medical problems evaluated in emergency departments. The primary objective was to determine if there were differences among groups regarding perceived urgency for each of the case scenarios. The decision regarding location of care and mode of transportation if going to the ED were secondary objectives. Tertiary objectives were to analyze the effect of time of presentation on medical decision making for these case scenarios and to determine if the groups studied believed that the Prudent Layperson Standard is an important issue.

Response Rate

The response rates for emergency physicians (54%) and primary care physicians (44%) were lower than anticipated for specialized populations (>65%) that were expected to be interested in the survey topic[87]. However, the response rates were within expected bounds for a survey-based study. The response rates for the laypeople are difficult to estimate accurately. Nonetheless, the rough estimates (15-33%) were in line with expected response rates for a self-administered survey without a participation incentive.

Urgency

Urgency was the primary outcome of interest and was analyzed in two ways: grouping the cases together to determine an overall trend and analyzing the cases individually to determine if differences existed for each case. There were significant

differences among the groups when analyzing the cases in aggregate (MANOVA). This supports the first alternate hypothesis[3] that there were significant differences among the three groups. Furthermore, the differences persisted when the groups were analyzed pair-wise in aggregate. After examining the graphical representation of the urgency data (Figure 3), it appears that the non-urgent cases (the baby with a fever and the ankle injury) may have been different from the urgent cases. A sub-analysis of these two non-urgent cases in aggregate revealed that significant overall differences persisted, but at a much more moderate level of significance ($p=0.0081$). Furthermore, the pair-wise comparisons revealed that laypeople and primary care physicians did not significantly differ for these non-urgent cases. This suggests that for less urgent cases, laypeople tend to agree with primary care physicians regarding urgency. The appropriateness of emergency care in less urgent medical conditions needs to be evaluated more thoroughly in further investigations.

The next step in testing the primary outcome of urgency was to analyze each case individually. The graphical analysis (Figure 3) revealed that for the urgent cases (chest pain, headache and GI bleed) emergency physicians closely agreed on the high level of urgency. The laypeople tended to make less urgent decisions regarding all the cases with the exception of the ankle injury case. In addition, laypeople had a great deal more variability regarding their decisions, and tended towards intermediate urgency. Primary care physicians were intermediate between the other two groups, in both perceived urgency and variability of responses.

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[3] H_{A1}: There is a statistically significant difference between the perceived urgency of care required for a group of common potentially emergent conditions among at least one pair of the three groups, laypeople, emergency physicians, and primary care physicians.

Statistical analysis revealed significant differences among groups for all cases except the case of the febrile child. With this exception, the second alternate hypothesis was supported[4]. Further analysis revealed that only in the headache case was there a difference between emergency physicians and primary care physicians. In addition, for the ankle injury case, the only significant difference lie between the laypeople and emergency physicians. Primary care physicians agreed with laypeople for both the non-urgent cases.

Location of Care

Location that care should be sought was one of the two secondary objectives. Analysis of this variable revealed that there were significant differences among the groups for each of the cases with the exception of the chest pain at 2AM case and the baby with a fever at 2PM case. For both cases, there was strong consensus regarding where care should be sought. Trends revealed by the graphic display of the location of care data (Figure 4) are interesting. Emergency physicians chose the ED as the location of care more often than the other groups and chose no care for the cases the least frequently. Primary care physicians paralleled emergency physicians ED usage for the chest pain and GI bleed cases, but chose to have the case patients call or see their regular physician for the headache. This group also tended to use the ED less frequently than the other two groups for the two non-urgent cases, possibly reflecting their gatekeeping responsibilities. The laypeople chose to use non-emergency department resources for the potentially urgent cases, and to increase their ED utilization for non-urgent cases.

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[4] H_{A2}: There is a statistically significant difference between the perceived urgency of care required for specific common potentially emergent conditions among at least one pair of the three groups, laypeople, emergency physicians, and primary care physicians.

Mode of Transportation

Mode of transportation to the ED was the other secondary objective. Analysis revealed that there was agreement regarding mode of transport for the non-urgent cases, and statistically significant differences in mode of transport for the urgent cases. Emergency physicians decided that an ambulance was appropriate more frequently than the other groups for the urgent cases. Primary care physicians were intermediate between the other two groups for ambulance usage in urgent cases. However, neither of the physician groups felt that an ambulance was appropriate for the non-urgent cases. Laypeople determined ambulance transportation necessary least often among the groups for the urgent cases, while advocating their use in the non-urgent cases more frequently, particularly at 2AM. This may reflect the increased uncertainty that comes with the late hour in the presence of worrisome symptoms.

Influence of Time of Day on Medical Decision-Making

Further analysis was performed on the location of care and mode of transportation data to determine if time affected the medical decision making for these variables. Overall groups, there were significant differences between the two times for all cases except mode of transportation for the baby with a fever case. The physician groups did not change their mode of transportation decision based on time. Location of care, however, differed for the headache and baby with a fever case between the two times for emergency physicians. The primary care physicians and laypeople differed within the respective group regarding the location of care variable between the two times for all

cases except the baby with a fever. Laypeople also significantly differed regarding mode of transportation for the GI bleed case.

Importance of Issue

The final question on the survey was designed to indicate whether the groups surveyed agreed that the Prudent Layperson Standard was important legislation. The question asked each group how the decision to finance emergency department care should be determined. Greater than 50% of each group felt that conditions an average person felt were emergencies should be reimbursed. Twenty-five percent of laypeople felt that the care should be paid for whether it was an emergency or not. Emergency physicians, one of the key groups involved in passing the federal legislation and actively involved in local measures across the country, were strongly (93%) in favor of letting an average person determine whether a condition was an emergency for payment. There could be many reasons for this strong support, among them stanch patient advocacy, a desire to decrease the complexity and effort involved in obtaining approval for care in the ED, and the need to comply with federal requirement to treat those that present to the ED. Though the majority of primary care physicians supported the idea that decisions of average people should be used to determine payment for emergency services, more than 25% felt that a gatekeeper's approval should be needed to justify payment. This 25% may be a result of the culture that has developed in Portland due to the very high penetration by managed care organizations and the emphasis placed on their role in controlling costs.

There was a statistically significant difference among the respondent groups for this question. On pair-wise analysis, however, the outlying group was the primary care

physicians. All comparisons with other groups and the primary care physicians revealed a significant difference in how payment should be authorized. The laypeople and emergency physicians were not significantly different. This supports that the Prudent Layperson Standard legislation is close to what both groups believe is an appropriate payment mechanism for emergency services.

Implications of the Results:

The results of this study need to be placed in a public policy context. The premise behind many of the gatekeeping regulations was that laypeople made inappropriate decisions on emergency department use, resulting in increased costs. The overall result of this study revealed that the medical decision making by laypeople differed from the physician groups. However, they tended to be more cautious in their use of the emergency department for the urgent cases and use the emergency department more for the non-urgent cases. These results may suggest that a full implementation of the Prudent Layperson Standard would cause little change in the use of emergency departments. Furthermore, there was no significant difference between the primary care physicians and emergency care physicians in four out of five cases. If decision making is truly as similar as these results suggest, there may be limited need for gatekeeping.

The Prudent Layperson Standard places the burden of decision making on the layperson. While this study does support that overall, the decisions of laypeople will unlikely result in a rapid escalation of costs. It also reveals that there is a great deal more variation in the decisions made by this group, tending towards intermediate urgency and location of care. This variability is likely to be unimportant in non-life threatening illnesses, but raises questions as to whether laypeople will seek care often enough if left

with their own decisions unsupported by experts. For example, some laypeople chose not to seek care despite classic symptoms of myocardial infarction. Laypeople may be best served by having the option to call for advice on cases that they are not certain about in order to help them determine when and where care should be sought. The advice should be non-binding in the Prudent Layperson Standard environment, serving as an information source to aid in medical decision making.

Another question is who should be the consulting physician/person on the other end of the telephone to render advice? Should that entity be modeled on the decision making of emergency physicians or of primary care physicians? In this study, the primary care physicians closely follow emergency physicians for the cases meant to simulate myocardial infarction and gastrointestinal hemorrhage, but these are the cases in which laypeople also realize a high level of urgency and tended to choose emergency care. The second case, that of a potential subarachnoid hemorrhage, the laypeople and primary care physicians are closely related in the lower urgency and location of care compared to emergency physicians. The likelihood of subarachnoid hemorrhage is low (~3%) but the 5 year mortality approaches 95% if left untreated and only 20% if treated. Despite the low probability of this diagnosis, three out of 100 times the person with the symptoms in case two should be seen in the emergency department. If responsible for giving advice, emergency physicians would have been more likely to prevent the potential poor outcome. However, these differences may reflect relative perspectives of the practice settings of primary care physicians relative to emergency physicians.

The non-urgent cases, the baby with a fever and the ankle injury, revealed that laypeople would use the emergency department more often than either group of

physicians. The overall numbers that would choose to obtain no care for these two cases was not statistically different among the groups. Both physician groups felt that the primary care physician could handle these cases in person or via telephone consultation more often than the laypeople did. However, all three groups agreed that some care or advice should be obtained at approximately the same frequency. The choice to pursue care for non-urgent care in the ED by laypeople may be more related to where they feel they can find physicians with the appropriate skills, experience, and available time for the medical problem in question.

The cases in which laypeople perceived lower urgency than both emergency physicians and primary care physicians highlight areas that require patient education. These cases also tended to be cases in which poor results were more likely if the target diagnosis was in fact present. Further study to assess layperson medical decision making should be done to reveal other emergent medical situations to be used to focus patient education.

Limitations

Generalizability

The data set was drawn from the three metropolitan counties in the Portland area: Multnomah, Washington, and Clackamas. There may be characteristics of this location that hinder this study's generalizability. It is likely that the study sample is not representative of Oregon because the sample is primarily drawn from an urban area whereas much of the rest of Oregon is rural. The large number of academic physicians practicing in the Portland area, and likely included in the physician samples, further limit the ability of this study to be generalized to the entire state of Oregon. It is also not likely representative of other urban areas secondary to the relative ethnic homogeneity of the Portland metro area and the higher than average number of people with medical insurance due to the Oregon Health Plan.

The layperson sample is likely to be different from a true random population sample. The investigators encountered a dilemma when trying to determine a proper, representative sample for this study. Secondary to limited funds, a mailed survey was impossible. The investigators debated how to obtain a representative sample from the Portland Tri-county area while minimizing potential biases. Initially, three large local malls, one in each of the counties were to be used, but logistic issues made these locations not possible. The three locations eventually chosen were, the Portland International Airport, a Bi-Mart in Oregon City, and the Portland Saturday Market. There was unlikely to be a systematic health care related bias at all three locations. This sampling method would exclude those that are unable to get to the survey locations, such

as the elderly, and those that do not go to these locations for any reason, such as the inability to afford airfare.

Comparing the demographic data with Portland Tri-county census data, we found that there were more respondents in the 18-24 age group than would be expected and fewer than expected in the other age groups. Younger age groups have fewer medical problems and have likely been to the ED less frequently than older age groups which may result in an underestimation of urgency due to lack of experience with acute medical problems more typical among older age groups. There were also more male than female respondents. The effect this difference would have on medical decision making is uncertain. The layperson sample had attained a higher level of education than expected in the Portland Tri-count region, greater than 46% having attained a bachelor's degree or greater compared with 19-26% expected. A likely explanation is that those with higher education would be more apt to agree to fill out the survey. A higher level of education is statistically correlated with belonging to a higher SES and higher level of family income. This in turn should be correlated with a higher percentage than expected with personal health insurance. This was not supported by the demographic data collected regarding medical insurance. In the Portland Tri-county region, approximately 90% of the population have some form of medical insurance, which is the same percentage found in our sample.

Another characteristic of the area studied is the high penetration by managed care, as high as 87%. This is relevant to the issue because the Prudent Layperson Standard was developed to protect enrollees of managed care plans from payment denial for emergency services. None of the questions used in the survey adequately addressed this issue.

However, the percentage of people with medical insurance was approximately equal to that expected in this population. It is likely that the majority of these respondents are enrolled in a managed care organization.

More than 79% of the layperson respondents had been to an emergency department for personal medical care. Sixty-four percent have been hospitalized at some point in their lives. These could bias the results if different from the visit rate for the general population. The number of laypeople that work in health care or a related field was 11%, not significantly different from the expected 8-12%. In addition, none of the people working in health care related fields were physicians nor did any provide primary care or emergency care services. In addition, exclusion from analysis did not change any of the results. Therefore, they were not removed from analysis. Two questions were asked to ascertain the level of illness and health care use in the respondents. The majority did not have chronic medical problems and used their physician two times or less in the last year. This likely reflects age bias toward the 18-24 year old group.

For the physician groups, the sex and age distributions were as expected. The distribution of primary care fields was broad and not over-representative of any one group. The majority of emergency physicians were emergency residency trained, but the sample did include some from other fields, as expected. The majority of both physician groups were board certified or eligible as expected in an urban, academic environment. The type of emergency department and the volume are both representative of those found in the Portland Tri-county area.

Approximately one third of the primary care physicians had emergency department experience, but only seven currently work in emergency departments. Eliminating those

primary care physicians that are currently working in an ED from analysis revealed only one change in the analysis; the difference in location of care selected for the case of a baby with a fever became significant. The physicians that were also working in the ED were therefor left in the analysis for the primary care physicians. This would tend to bias comparisons between the physician groups towards the null.

Sample Size/Power

The sample size of the physician groups had limitations. The primary care physician sample size were limited by funding for the mailings, and the emergency physician sample was limited by the number of practicing emergency physicians in the Portland Tri-County area. The sample size limitation was not an issue for this study because the number of subjects required for a power of 80% was 97, which was obtained for each study group.

Oregon Health Plan Data

The data from the Oregon Health Plan reported five-year mortality for both treatment and no treatment. The ability to apply this data to acute disease process may have limitations. For example, the mortality for acute myocardial infarction is affected by both acute interventions and long term treatments such as ß-blockade. However, these data were used only to help provide some objective assessment of risk when determining which types of case to include in the survey.

Hypothetical Case Scenarios

Another potential limitation was that the case scenarios were hypothetical. The cases may not be truly representative of common cases or common presenting symptoms. The advantage to designing the hypothetical cases was to be able to determine the

probabilities of various diagnoses using a computerized decision making tool as well as diagnosis related mortality from the Oregon Health Plan data. The incorporation of the data in the case scenarios has not been validated. This study formed a preliminary basis validating the use of the data in this manner, however further study is required.

A second aspect to the limitation of the hypothetical case scenarios lies in that the decision makers can sit and fill out the survey without the pressure and stress of a current potentially emergent condition. It is likely that there are differences between how one perceives urgency when confronted with the symptoms in ones-self or a family member. Further study regarding the differences between medical decision making for hypothetical cases compared with actual medical decision making is needed.

Opportunities for Further Study

The intention of this study was to perform a pilot study to determine if there were differences in medical decision making among the three groups that were studied and this goal was successful. The next step will be to perform a follow-up study and eliminate the shortcomings of this pilot project. Some methodological problems that need to be addressed in the follow-up study include obtaining a random sample of laypeople using a mailed survey, increase the number of case scenarios with an increase in the non-urgent situations for better evaluation of these critical cases, and including other medical decision makers such as managed care organization reviewers as additional study populations.

Summary and Conclusions

This study revealed that there were significant differences in the overall medical decision making for the cases in the survey among the three groups studied: laypeople, emergency physicians, and primary care physicians. These differences, overall, revealed that laypeople experienced less urgency for the medical problems that had a greater likelihood of poor outcomes if not treated and greater urgency in non-urgent cases. These results may suggest that the Prudent Layperson Standard is unlikely to change emergency department usage significantly from current levels, and could result in an overall decrease. However, a larger, more generalizable study will be required to support these conclusions in populations other than the Portland Tri-county region.

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Appendices

Appendix 1: Volunteer Script for Prudent Layperson Survey Administration

"Hello, my name is _____. I am a medical student at Oregon Health Sciences University (If in Portland International Airport, add "in Portland"). I am administering a survey to evaluate how non-medical people make medical decisions. The results of this anonymous survey could affect federal health care policy. I would appreciate it if you would take 10-15 minutes to fill out this survey." (If young appearing, ask: "Are you 18 years or older?")

<u>If accepted:</u>

"Here is a copy of the survey, a clipboard and a pen. There is a brief letter explaining the survey in more detail on the front. Inside are two pages of questions with instructions on how to answer each section. On the back page, there are several questions about you. If you have any questions, please do not hesitate to ask. When you are done, please return the survey to me. Again, all your responses are anonymous and will be kept confidential."

After you receive the completed survey, check for completion.
If complete, say:

"Thank you for your participation."

If not complete, ask:

"Sir/Madam, there is some crucial information missing that will make using the information in your survey difficult, would mind filling out the missing information?"

If they refuse, ask:

"Can I help you fill in the remaining responses?"

If they again refuse, say:

"Thank you for your participation."

Move on.

<u>If rejected:</u>

"Thank you for listening to me."

Move on.

Appendix 2: Prudent Layperson Survey
Layperson cover letter and survey

Page 1

Department of Public Health
and
Department of Emergency Medicine
Oregon Health Sciences University

Prudent Layperson Survey

There has been a great deal of research performed analyzing how physicians make medical decisions. There have also been several studies that compare the medical decision making between different types of physicians. There have not been any studies comparing the medical decision making of laypeople with that of physicians. We believe that determining the similarities and differences between these groups is important to help guide health education, improve communication between doctors and their patients, and guide federal and state health care policies.

Therefore, we are interested in your answers to the questions in this survey. This questionnaire should take less than 10 minutes to complete.

The information you provide will be kept completely confidential and anonymous. The questionnaire has no ID numbers, codes or anything else that can be used to link this questionnaire with any individual. No identifying information of any kind, except group summaries, will be released. Once you return this survey to the person that gave it to you, please allow him or her to check the survey briefly for completeness. This same person is also available to answer any questions you may have while filling out the questionnaire.

Thank you for your participation.

David Claypool, MD
Fellow
Division of Medical Informatics and Outcomes Research

Andrew Zechnich, MD, MPH
Assistant Professor
Department of Emergency Medicine

Any questions can be directed to David Claypool at:
Oregon Health Sciences University
3181 SW Sam Jackson Park Road, MS BICC
Portland, OR 97201
Phone: (503) 494-2388
Fax: (503) 494-4551

Instructions:
Below are five medical case simulations. Please read each case carefully. Assume that the person described in each simulation has medical insurance and a regular doctor. Each simulation is followed by a question asking you to determine how soon the person should be seen if he or she has the symptoms described in the case. Please place a mark on the line below each case indicating how soon you believe that the person should seek medical care on a scale ranging from no hurry to seek care immediately.

Case 1 Imagine a 47-year-old overweight man who smokes and has a history of sugar diabetes. He begins to have pain in the middle of his chest without exercise that is sharp and radiates to his jaw.
How soon would you seek medical care for him?

There is no hurry — Case1 Q1 — I would seek care immediately

Case 1, Question A: Imagine that the symptoms described in case 1 occurred at 2 PM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 1, Question B: Imagine that the symptoms described in case 1 occurred at 2 AM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 2 Imagine a 37-year-old female janitor with no medical problems other than frequent headaches that are relieved by Tylenol. She has sudden onset of a severe generalized headache that is much worse than her usual headaches. She also feels sick to her stomach.
How soon would you seek medical care for her?

There is no hurry — Case2 Q1 — I would seek care immediately

Case 2, Question A: Imagine that the symptoms described in case 2 occurred at 2 PM, what would you do?
- A. She does not need to be seen.
- B. She should call or see her regular doctor.
- C. She should go to an emergency department now.

Case 2, Question B: Imagine that the symptoms described in case 2 occurred at 2 AM, what would you do?
- A. She does not need to be seen.
- B. She should call or see her regular doctor.
- C. She should go to an emergency department now.

Case 3 Imagine an 18-month-old boy who has been in general good health. Today, he doesn't seem to want to play with his brothers or sisters and cries more often than normal. His temperature is taken and reads 102°F. He has not vomited and does not have diarrhea.
How soon would you seek medical care for him?

There is no hurry — Case3 Q1 — I would seek care immediately

Case 3, Question A: Imagine that the symptoms described in case 3 occurred at 2 PM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 3, Question B: Imagine that the symptoms described in case 3 occurred at 2 AM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 4 Imagine an 18-year-old female high school student. While running across a field, she steps in a gopher hole and twists her ankle. She is in a great deal of pain but is able to put weight on it.
How soon would you seek medical care for her?

There is no hurry — Case4 Q1 — I would seek care immediately

Case 4, Question A: Imagine that the symptoms described in case 4 occurred at 2 PM, what would you do?
- A. She does not need to be seen.
- B. She should call or see her regular doctor.
- C. She should go to an emergency department now.

Case 4, Question B: Imagine that the symptoms described in case 4 occurred at 2 AM, what would you do?
- A. She does not need to be seen.
- B. She should call or see her regular doctor.
- C. She should go to an emergency department now.

Case 5 Imagine a 68-year-old man with frequent heartburn. He was watching television when he begins to complain of severe cramping in his stomach that was unlike his usual heartburn. He also complains of a dry mouth and feeling lightheaded. He looks pale and he is making less sense than usual. He had a bowel movement earlier that appeared black.
How soon would you seek medical care for him?

There is no hurry — Case5 Q1 — I would seek care immediately

Case 5, Question A: Imagine that the symptoms described in case 5 occurred at 2 PM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 5, Question B: Imagine that the symptoms described in case 5 occurred at 2 AM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Instructions:
Each pair of questions below refer to the cases you read on the previous page. Keep these cases in mind as you answer the following questions. In addition, please imagine that these cases are taking place at the times indicated below. Please mark the one answer that best represents the action you would take in each situation.

Please refer to the questions above and place a check mark next to each case for which you chose to go to the emergency department.

For each case that you chose to go to the emergency room, choose the way you would get to the emergency department.

			Walk or public transport	Call a cab	Drive yourself	Have someone else drive	Call 911 for an ambulance
Case 1 - 47 year old man with chest pain	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○
Case 2 - 37 year old woman with a headache	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○
Case 3 - 18 mo. boy with fever	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○
Case 4 - 18 year old woman with ankle pain	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○
Case 5 - 68 year old man with stomach pain	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○

Please answer the following questions about yourself. All response will be kept strictly confidential.

Gender

☐ Male ☐ Female

Year of Birth: Year of birth

What is your highest level of education?

☐ Less than 9th grade
☐ 9th to 12th grade, no diploma
☐ High school graduate, G.E.D.
☐ Some college, no degree
☐ Associate degree or trade school
☐ Bachelor's degree
☐ Graduate or professional degree

Have you ever been to an emergency department to seek personal medical attention?

☐ Yes ☐ No

Have you ever stayed overnight in a hospital?

☐ Yes ☐ No

Do you work in health care?

☐ Yes ☐ No

If you work in health care, what is your job?

If you work in HC

Do you have a primary care doctor?

☐ Yes ☐ No

Are you covered by medical insurance?

☐ Yes ☐ No

If you are covered by medical insurance, do you have a co-payment every time your see you doctor?

☐ Yes ☐ No

Do you have any chronic medical problems?

☐ Yes ☐ No

If you answered yes above, what is (are) your medical problem(s)?

☐ Heart Disease
☐ High Blood Pressure
☐ Stroke
☐ Cancer
☐ Epilepsy
☐ Lung Disease
☐ Gastro-intestinal Disease
☐ Kidney Disease
☐ Diabetes
☐ Arthritis
☐ Back Pain
☐ Other (Please fill in) _____

How many times have you been to the doctor in the past year for personal medical care?

O None O 1-2 O 3-5 O 6-10 O >10

As you may know, health care costs are rising. There has been a lot of attention paid to the issue of reducing emergency department visits for non-emergencies because emergency department care is expensive. Cutting out emergency department visits that are not emergencies could save a lot of money. If costs don't go down, it is likely that patients will see an increase in their co-payments for emergency department use as well as overall increases in the cost of health insurance.

Keeping this in mind, select the single answer below that best completes the sentence, "My insurance should pay for every visit I make to an emergency department..."

O ..., whether it is an emergency or not.
O ...for conditions that an average person would consider an emergency.
O ...that my regular doctor authorizes.
O ...that, after being evaluated, actually was an emergency condition.

Appendix 3: Prudent Layperson Survey
Emergency physician first mailing

Page 1

Department of Public Health
and
Department of Emergency Medicine
Oregon Health Sciences University

Prudent Layperson Survey

There has been a great deal of research performed analyzing how physicians make medical decisions. There have also been several studies that compare the medical decision making between different types of physicians. There have not been any studies comparing the medical decision making of laypeople with that of physicians. We believe that determining the similarities and differences between these groups is important to help guide health education, improve communication between doctors and their patients, and guide federal and state health care policies.

Therefore, we are interested in your answers to the questions in this survey. You have been selected because you are an emergency physician living in the Portland Tri-county area. This questionnaire should take less than 10 minutes to complete.

The information you provide will be kept completely confidential and anonymous. The questionnaire has no ID numbers, codes or anything else that can be used to link this questionnaire with any individual. No identifying information of any kind, except group summaries, will be released. You will notice that the return envelope we have provided has a number on it. That number is for tracking the returned questionnaires, so that we can follow-up unreturned questionnaires. Upon receipt, each questionnaire will be immediately separated from the envelope.

Please return the questionnaire by February 26, 1999 in the envelope provided. Thank you for your participation.

David Claypool, MD
Fellow
Division of Medical Informatics and Outcomes Research

Andrew Zechnich, MD, MPH
Assistant Professor
Department of Emergency Medicine

Any questions can be directed to David Claypool at:
Oregon Health Sciences University
3181 SW Sam Jackson Park Road, MS BICC
Portland, OR 97201
Phone: (503) 494-2388
Fax: (503) 494-4551

Instructions:
Below are five medical case simulations. Please read each case carefully. Assume that the person described in each simulation has medical insurance and a regular doctor. Each simulation is followed by a question asking you to determine how soon the person should be seen if he or she has the symptoms described in the case. Please place a mark on the line below each case indicating how soon you believe that the person should seek medical care on a scale ranging from no hurry to seek care immediately.

Case 1 Imagine a 47-year-old overweight man who smokes and has a history of sugar diabetes. He begins to have pain in the middle of his chest without exercise that is sharp and radiates to his jaw.
How soon would you seek medical care for him?

There is no hurry — Case1 Q1 — I would seek care immediately

Case 2 Imagine a 37-year-old female janitor with no medical problems other than frequent headaches that are relieved by Tylenol. She has sudden onset of a severe generalized headache that is much worse than her usual headaches. She also feels sick to her stomach.
How soon would you seek medical care for her?

There is no hurry — Case2 Q1 — I would seek care immediately

Case 3 Imagine an 18-month-old boy who has been in general good health. Today, he doesn't seem to want to play with his brothers or sisters and cries more often than normal. His temperature is taken and reads 102°F. He has not vomited and does not have diarrhea.
How soon would you seek medical care for him?

There is no hurry — Case3 Q1 — I would seek care immediately

Case 4 Imagine an 18-year-old female high school student. While running across a field, she steps in a gopher hole and twists her ankle. She is in a great deal of pain but is able to put weight on it.
How soon would you seek medical care for her?

There is no hurry — Case4 Q1 — I would seek care immediately

Case 5 Imagine a 68-year-old man with frequent heartburn. He was watching television when he begins to complain of severe cramping in his stomach that was unlike his usual heartburn. He also complains of a dry mouth and feeling lightheaded. He looks pale and he is making less sense than usual. He had a bowel movement earlier that appeared black.
How soon would you seek medical care for him?

There is no hurry — Case5 Q1 — I would seek care immediately

Instructions:
Each pair of questions below refer to the cases you read on the previous page. Keep these cases in mind as you answer the following questions. In addition, please imagine that these cases are taking place at the times indicated below. Please mark the one answer that best represents the action you would take in each situation.

Case 1, Question A: Imagine that the symptoms described in case 1 occurred at 2 PM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 1, Question B: Imagine that the symptoms described in case 1 occurred at 2 AM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 2, Question A: Imagine that the symptoms described in case 2 occurred at 2 PM, what would you do?
- A. She does not need to be seen.
- B. She should call or see her regular doctor.
- C. She should go to an emergency department now.

Case 2, Question B: Imagine that the symptoms described in case 2 occurred at 2 AM, what would you do?
- A. She does not need to be seen.
- B. She should call or see her regular doctor.
- C. She should go to an emergency department now.

Case 3, Question A: Imagine that the symptoms described in case 3 occurred at 2 PM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 3, Question B: Imagine that the symptoms described in case 3 occurred at 2 AM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 4, Question A: Imagine that the symptoms described in case 4 occurred at 2 PM, what would you do?
- A. She does not need to be seen.
- B. She should call or see her regular doctor.
- C. She should go to an emergency department now.

Case 4, Question B: Imagine that the symptoms described in case 4 occurred at 2 AM, what would you do?
- A. She does not need to be seen.
- B. She should call or see her regular doctor.
- C. She should go to an emergency department now.

Case 5, Question A: Imagine that the symptoms described in case 5 occurred at 2 PM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 5, Question B: Imagine that the symptoms described in case 5 occurred at 2 AM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Please refer to the questions above and place a check mark next to each case for which you chose to go to the emergency department.

For each case that you chose to go to the emergency room, choose the way you would get to the emergency department.

			Walk or public transport	Call a cab	Drive yourself	Have someone else drive	Call 911 for an ambulance
Case 1 - 47 year old man with chest pain	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○
Case 2 - 37 year old woman with a headache	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○
Case 3 - 18 mo. boy with fever	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○
Case 4 - 18 year old woman with ankle pain	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○
Case 5 - 68 year old man with stomach pain	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○

Please answer the following questions about yourself. All response will be kept strictly confidential.

Gender

☐ Male ☐ Female

Year of Birth: _____

	Year completed or last year in training program(s)	Board Certified	Board Eligible	Neither
Family Practice	hily Practic	Family Practice Board	☐	
Internal Medicine	rnal Medicin	Internal Medicine Board	☐	
Obstetrics/Gynecology	ricsGynecol	ObstetricsGynecology	☐	
Pediatrics	Pediatrics Y	Pediatrics Board	☐	
Emergency Medicine	tency Medic	Emergency Medicine	☐	
Other (fill in below)				
	Other Yr	Other Board	☐	☐

	Approximate % of time spent in practice setting(s)
Family Practice	mily Practice
Internal Medicine	ernal Medicine
Obstetrics/Gynecology	etricsGynecolog
Pediatrics	Pediatrics pct
Emergency Medicin	rgency Medicin
General Practice	neral Practice
Other (fill in below)	
	Other pct

What is your primary practice setting?

- O Tertiary care medical center
- O Large community hospital
- O Public hospital
- O Small community hospital
- O Urgent care center
- O Retired/Not currently practicing
- O Other

What is the annual patient volume seen at your primary practice setting?

- O 0-5,000
- O 5,001-10,000
- O 10,001-25,000
- O 25,001 - 50,000
- O 50,001 - 100,000
- O >100,000

As you may know, health care costs are rising. There has been a lot of attention paid to the issue of reducing emergency department visits for non-emergencies because emergency department care is expensive. Cutting out emergency department visits that are not emergencies could save a lot of money. If costs don't go down, it is likely that patients will see an increase in their co-payments for emergency department use as well as overall increases in the cost of health insurance.

Keeping this in mind, select the single answer below that best completes the sentence, "My insurance should pay for every visit I make to an emergency department..."

- O ..., whether it is an emergency or not.
- O ...for conditions that an average person would consider an emergency.
- O ...that my regular doctor authorizes.
- O ...that, after being evaluated, actually was an emergency condition.

Appendix 4: Prudent Layperson Survey
Emergency physician second mailing postcard reminder

March 4, 1999

About two weeks ago, we sent you a questionnaire entitled Prudent Layperson Survey. Your name was selected because the address listed with the Oregon Board of Medical Examiners is in the Portland Tri-county area and you indicated that you practice emergency medicine. A survey was sent to each of the 190 emergency physicians meeting this criteria.

If you have already returned the questionnaire, please accept our sincere thanks. If not, please complete it and return it today. Due to the limited number of emergency physicians in the Portland Tri-county area, every returned survey is important to attain an adequate quantity of data for this study.

If you did not receive the questionnaire, or it was misplaced, please call me at (503) 494-2388 and I will get another one in the mail to you immediately.

Sincerely,

David Claypool, M.D.
Oregon Health Sciences University
Division of Medical Informatics and Outcomes Research

Appendix 5: Prudent Layperson Survey
Emergency physician third mailing cover letter

Department of Public Health
and
Department of Emergency Medicine
Oregon Health Sciences University

Prudent Layperson Survey

There has been a great deal of research performed analyzing how physicians make medical decisions. There have also been several studies that compare the medical decision-making between different types of physicians. There have not been any studies comparing the medical decision making of laypeople with that of physicians. We believe that determining the similarities and differences between these groups is important to help guide health education, improve communication between doctors and their patients, and guide federal and state health care policies.

Three to four weeks ago, you should have received a copy of this survey. So far, the response rate has been about 30%, but we need at least 70% to attain a representative sample. **Your survey is necessary in order to adequately study the decision-making process of emergency physicians.** You have been selected because you indicated to the Oregon Board of Medical Examiners that you practice emergency medicine. This questionnaire should take less than 15 minutes to complete. Please take the time to complete it.

The information you provide will be kept completely confidential and anonymous. The questionnaire has no ID numbers, codes or anything else that can be used to link this questionnaire with any individual. No identifying information of any kind, except group summaries, will be released. You will notice that the return postage-paid envelope we have provided has a number on it. That number is for tracking the returned questionnaires, so that we can follow-up unreturned questionnaires. Upon receipt, each questionnaire will be immediately separated from the envelope.

Please return the questionnaire by March 29, 1999 in the envelope provided. Thank you for your participation.

David Claypool, MD
Fellow
Division of Medical Informatics and Outcomes Research

Andrew Zechnich, MD, MPH
Assistant Professor
Department of Emergency Medicine

Any questions can be directed to David Claypool at:
Oregon Health Sciences University
3181 SW Sam Jackson Park Road, MS BICC
Portland, OR 97201
Phone: (503) 494-2388
Fax: (503) 494-4551

Appendix 6: Prudent Layperson Survey
Primary care physician first mailing

Page 1

Department of Public Health
and
Department of Emergency Medicine
Oregon Health Sciences University

Prudent Layperson Survey

There has been a great deal of research performed analyzing how physicians make medical decisions. There have also been several studies that compare the medical decision making between different types of physicians. There have not been any studies comparing the medical decision making of laypeople with that of physicians. We believe that determining the similarities and differences between these groups is important to help guide health education, improve communication between doctors and their patients, and guide federal and state health care policies.

Therefore, we are interested in your answers to the questions in this survey. You have been randomly selected from the Oregon Board of Medical Examiners physician database as a physician that practices primary care and lives in the Portland Tri-county area. This questionnaire should take less than 10 minutes to complete.

The information you provide will be kept completely confidential and anonymous. The questionnaire has no ID numbers, codes or anything else that can be used to link this questionnaire with any individual. No identifying information of any kind, except group summaries, will be released. You will notice that the return envelope we have provided has a number on it. That number is for tracking the returned questionnaires, so that we can follow-up unreturned questionnaires. Upon receipt, each questionnaire will be immediately separated from the envelope.

Please return the questionnaire by February 26, 1999 in the envelope provided. Thank you for your participation.

David Claypool, MD
Fellow
Division of Medical Informatics and Outcomes Research

Andrew Zechnich, MD, MPH
Assistant Professor
Department of Emergency Medicine

Any questions can be directed to David Claypool at:
Oregon Health Sciences University
3181 SW Sam Jackson Park Road, MS BICC
Portland, OR 97201
Phone: (503) 494-2388
Fax: (503) 494-4551

Instructions:
Below are five medical case simulations. Please read each case carefully. Assume that the person described in each simulation has medical insurance and a regular doctor. Each simulation is followed by a question asking you to determine how soon the person should be seen if he or she has the symptoms described in the case. Please place a mark on the line below each case indicating how soon you believe that the person should seek medical care on a scale ranging from no hurry to seek care immediately.

Case 1 Imagine a 47-year-old overweight man who smokes and has a history of sugar diabetes. He begins to have pain in the middle of his chest without exercise that is sharp and radiates to his jaw.
How soon would you seek medical care for him?

There is no hurry — Case1 Q1 — I would seek care immediately

Case 2 Imagine a 37-year-old female janitor with no medical problems other than frequent headaches that are relieved by Tylenol. She has sudden onset of a severe generalized headache that is much worse than her usual headaches. She also feels sick to her stomach.
How soon would you seek medical care for her?

There is no hurry — Case2 Q1 — I would seek care immediately

Case 3 Imagine an 18-month-old boy who has been in general good health. Today, he doesn't seem to want to play with his brothers or sisters and cries more often than normal. His temperature is taken and reads 102°F. He has not vomited and does not have diarrhea.
How soon would you seek medical care for him?

There is no hurry — Case3 Q1 — I would seek care immediately

Case 4 Imagine an 18-year-old female high school student. While running across a field, she steps in a gopher hole and twists her ankle. She is in a great deal of pain but is able to put weight on it.
How soon would you seek medical care for her?

There is no hurry — Case4 Q1 — I would seek care immediately

Case 5 Imagine a 68-year-old man with frequent heartburn. He was watching television when he begins to complain of severe cramping in his stomach that was unlike his usual heartburn. He also complains of a dry mouth and feeling light headed. He looks pale and he is making less sense than usual. He had a bowel movement earlier that appeared black.
How soon would you seek medical care for him?

There is no hurry — Case5 Q1 — I would seek care immediately

Instructions:
Each pair of questions below refer to the cases you read on the previous page. Keep these cases in mind as you answer the following questions. In addition, please imagine that these cases are taking place at the times indicated below. Please mark the one answer that best represents the action you would take in each situation.

Case 1, Question A: Imagine that the symptoms described in case 1 occurred at 2 PM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 1, Question B: Imagine that the symptoms described in case 1 occurred at 2 AM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 2, Question A: Imagine that the symptoms described in case 2 occurred at 2 PM, what would you do?
- A. She does not need to be seen.
- B. She should call or see her regular doctor.
- C. She should go to an emergency department now.

Case 2, Question B: Imagine that the symptoms described in case 2 occurred at 2 AM, what would you do?
- A. She does not need to be seen.
- B. She should call or see her regular doctor.
- C. She should go to an emergency department now.

Case 3, Question A: Imagine that the symptoms described in case 3 occurred at 2 PM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 3, Question B: Imagine that the symptoms described in case 3 occurred at 2 AM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 4, Question A: Imagine that the symptoms described in case 4 occurred at 2 PM, what would you do?
- A. She does not need to be seen.
- B. She should call or see her regular doctor.
- C. She should go to an emergency department now.

Case 4, Question B: Imagine that the symptoms described in case 4 occurred at 2 AM, what would you do?
- A. She does not need to be seen.
- B. She should call or see her regular doctor.
- C. She should go to an emergency department now.

Case 5, Question A: Imagine that the symptoms described in case 5 occurred at 2 PM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Case 5, Question B: Imagine that the symptoms described in case 5 occurred at 2 AM, what would you do?
- A. He does not need to be seen.
- B. He should call or see his regular doctor.
- C. He should go to an emergency department now.

Please refer to the questions above and place a check mark next to each case for which you chose to go to the emergency department.

For each case that you chose to go to the emergency room, choose the way you would get to the emergency department.

			Walk or public transport	Call a cab	Drive yourself	Have someone else drive	Call 911 for an ambulance
Case 1 - 47 year old man with chest pain	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○
Case 2 - 37 year old woman with a headache	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○
Case 3 - 18 mo. boy with fever	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○
Case 4 - 18 year old woman with ankle pain	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○
Case 5 - 68 year old man with stomach pain	2 PM	☐	○	○	○	○	○
	2 AM	☐	○	○	○	○	○

Please answer the following questions about yourself. All response will be kept strictly confidential.

Gender

☐ Male ☐ Female

Year of Birth: _____

	Year completed or last year in training program(s)	Board Certified	Board Eligible	Neither
Family Practice	ily Practic	Family Practice Board	☐	☐
Internal Medicine	nal Medicir	Internal Medicine Board	☐	☐
Obstetrics/Gynecology	ricsGynecol	ObstetricsGynecology	☐	☐
Pediatrics	ediatrics Y	Pediatrics Board	☐	☐
Emergency Medicine	ency Medic	Emergency Medicine	☐	☐
Other (fill in below)				
	Other Yr	Other Board	☐	☐

	Approximate % of time spent in practice setting(s)
Family Practice	mily Practice
Internal Medicine	ernal Medicine
Obstetrics/Gynecology	etricsGynecolo
Pediatrics	Pediatrics pct
Emergency Medicin	gency Medicin
General Practice	neral Practice
Other (fill in below)	
	Other pct

Do you have any experience working in an emergency department at anytime since graduation but not in a training program?

O Yes O No

Are some of your patients required to get your authorization in order to have their emergency department visits reimbursed?

O Yes O No

Approximately how many emergency department visit authorizations are you asked to give per month?

Number of Auth

If you currently work in an emergency department, please complete the following questions:

How would you describe the largest emergency department in which you currently work?

- O Tertiary care medical center
- O Large community hospital
- O Public hospital
- O Small community hospital
- O Urgent care center
- O Retired/Not currently practicing
- O Other

What is the annual patient volume seen the largest emergency department in which you currently work?

- O 0-5,000
- O 5,001-10,000
- O 10,001-25,000
- O 25,001 - 50,000
- O 50,001 - 100,000
- O >100,000

As you may know, health care costs are rising. There has been a lot of attention paid to the issue of reducing emergency department visits for non-emergencies because emergency department care is expensive. Cutting out emergency department visits that are not emergencies could save a lot of money. If costs don't go down, it is likely that patients will see an increase in their co-payments for emergency department use as well as overall increases in the cost of health insurance.

Keeping this in mind, select the single answer below that best completes the sentence, "My insurance should pay for every visit I make to an emergency department..."

- O ..., whether it is an emergency or not.
- O ...for conditions that an average person would consider an emergency.
- O ...that my regular doctor authorizes.
- O ...that, after being evaluated, actually was an emergency condition.

Appendix 7: Prudent Layperson Survey
Primary care physician second mailing postcard reminder

March 2, 1999

About two weeks ago, we sent you a questionnaire entitled Prudent Layperson Survey. Your name was selected because the address listed with the Oregon Board of Medical Examiners is in the Portland Tri-County area and you indicated that you practice a primary care specialty. A survey was sent to 300 primary care physicians meeting this criteria.

If you have already returned the questionnaire, please accept our sincere thanks. If not, please complete it and return it today. Because it was sent to only a small number of the practicing primary care physicians in the Tri-County area, we very much need your questionnaire if the results are to accurately represent this group.

If you did not receive the questionnaire, or it was misplaced, please call me at (503) 494-2388 and I will get another one in the mail to you immediately.

Sincerely,

David Claypool, M.D.
Oregon Health Sciences University

Appendix 8: Prudent Layperson Survey
Primary care physician third mailing cover letter

Department of Public Health
and
Department of Emergency Medicine
Oregon Health Sciences University

Prudent Layperson Survey

There has been a great deal of research performed analyzing how physicians make medical decisions. There have also been several studies that compare the medical decision-making between different types of physicians. There have not been any studies comparing the medical decision making of laypeople with that of physicians. We believe that determining the similarities and differences between these groups is important to help guide health education, improve communication between doctors and their patients, and guide federal and state health care policies.

Three to four weeks ago, you should have received a copy of this survey. So far, the response rate has been about 30%, but we need at least 70% to attain a representative sample. **Your survey is necessary in order to adequately study the decision-making process of primary care physicians.** You have been randomly selected from the Oregon Board of Medical Examiners physician database as a physician that practices primary care and lives in the Portland Tri-county area. This questionnaire should take less than 15 minutes to complete. Please take the time to complete it.

The information you provide will be kept completely confidential and anonymous. The questionnaire has no ID numbers, codes or anything else that can be used to link this questionnaire with any individual. No identifying information of any kind, except group summaries, will be released. You will notice that the return postage-paid envelope we have provided has a number on it. That number is for tracking the returned questionnaires, so that we can follow-up unreturned questionnaires. Upon receipt, each questionnaire will be immediately separated from the envelope.

Please return the questionnaire by March 29, 1999 in the envelope provided. Thank you for your participation.

David Claypool, MD
Fellow
Division of Medical Informatics and Outcomes Research

Andrew Zechnich, MD, MPH
Assistant Professor
Department of Emergency Medicine

Any questions can be directed to David Claypool at:
Oregon Health Sciences University
3181 SW Sam Jackson Park Road, MS BICC
Portland, OR 97201
Phone: (503) 494-2388
Fax: (503) 494-4551

Appendix 9: Case Scenarios Two, Three and Five

Case 2: "Imagine a 37-year-old female janitor with no medical problems other than frequent headaches that are relieved by Tylenol. She has sudden onset of a severe generalized headache that is much worse than her usual headaches. She also feels sick to her stomach. How soon would you seek medical care for her?"

The target diagnosis was ruptured cerebral aneurysm. The following were the characteristics entered into the Bayesean calculator: age 37, sex female, nausea, headache different than usual, headache generalized, headache the worst in the patient's experience, headache severe, and headache with rapid onset. The calculated *a posteriori* probability of a ruptured cerebral aneurysm was 0.03. Entering the data into the consultation portion of Iliad 4.5 revealed that there was a 84% chance that the diagnosis was common migraine headache, a 41% chance that the diagnosis was mixed tension migraine, 12% chance that the diagnosis was viral gastroenteritis, a 3% chance that the diagnosis was subarachnoid hemorrhage (Berry aneurysm) and a 1% or lower chance that the diagnosis was one of many other disease processes. (According to the data collected for the Oregon Health Plan, five year mortality with and without treatment are as follows: common migraine headache or mixed tension migraine – 0%and 0.99%, and subarachnoid hemorrhage (Berry aneurysm) – 20% and 95%.

Case 3: "Imagine an 18-month-old boy who has been in general good health. Today, he doesn't seem to want to play with his brothers or sisters and

cries more often than normal. His temperature is taken and reads 102°F. He has not vomited and does not have diarrhea. How soon would you seek medical care for him?"

The target diagnosis was meningitis. The following were the characteristics entered into the Bayesean calculator: age less than 2 years, sex male, lethargy, fever 102°F or higher, no vomiting, and no diarrhea. The calculated *a posteriori* probability of meningitis is nearly zero (0.000156). Entering the data into the consultation portion of Iliad 4.5 revealed that there was a 41% chance that the diagnosis was Roseola, a 1% chance that the diagnosis was influenza, and a less than 1% chance that the diagnosis was one of many other disease processes. According to the data collected for the Oregon Health Plan, five year mortality with and without treatment are as follows: roseola –0% and 0%, and influenza – 0% and 0%.

Case 5: "Imagine a 68-year-old man with frequent heartburn. He was watching television when he begins to complain of severe cramping in his stomach that was unlike his usual heartburn. He also complains of a dry mouth and feeling light headed. He looks pale and he is making less sense than usual. He had a bowel movement earlier that appeared black. How soon would you seek medical care for him?"

The target diagnosis was gastrointestinal hemorrhage. The following were the characteristics entered into the Bayesean calculator: age 68, sex male, skin color pale, recently passed black stool, dry mouth, recent onset of confusion, history of heartburn and lightheadedness. The calculated *a posteriori* probability

of acute gastrointestinal blood loss was 0.74. Entering the data into the consultation portion of Iliad 4.5 revealed that there was a 43% chance that the diagnosis was gastroesophageal reflux disease, an 18% chance that the diagnosis was bleeding esophageal varices, a 4% chance that the diagnosis was generalized anxiety disorder, a 3% chance that the diagnosis was angiodysplasia of the gastrointestinal tract, a 3% chance that the diagnosis was diverticulitis, a 2% chance that the diagnosis was a gastric ulcer, benign, a 2% chance that the diagnosis was hypoglycemia, a 2% chance that the diagnosis was a partial complex seizure, a 2% chance that the diagnosis was gastric cancer, a 1% chance that the diagnosis was a Mallory-Weiss tear, a 1% chance that the diagnosis was a duodenal ulcer, and a 1% chance that the diagnosis was SIADH (Syndrome of inappropriate ADH secretion). All other diagnosis had a less than 1% probability. According to the data collected for the Oregon Health Plan, five year mortality with and without treatment are as follows: gastroesophageal reflux disease – 0% and 0%, bleeding esophageal varices – 10% and 90%, generalized anxiety disorder – 0% and 1%, angiodysplasia of the gastrointestinal tract - unknown, diverticulitis – 10% and 30%, gastric ulcer, begnin or duodenal ulcer – 1% and 10%, hypoglycemia – 5% and 10%, partial complex seizure – 0% and 1%, gastric cancer – 91% and 100%, Mallory-Weiss tear – 10% and 90%, and SIADH – unknown.

Appendix 10: Letter of Support

To whom it may concern,

The bearer of this letter is _____, a medical student attending Oregon Health Sciences University. She is distributing surveys that are part of a study being performed at Oregon Health Sciences University as part of a master's thesis project in the Department of Public Health. The primary author of the thesis is David Claypool, M.D. This study, entitled "Comparison of Decision making Among Prudent Laypeople, Emergency Physicians and Primary Care Physicians," has been approved by the Institutional Review Board at Oregon Health Sciences. Permission was granted to distribute this survey by Barbara LaBrosse at the Port Authority of Portland (460-4232). If there are any questions, please call either Ms. LaBrosse or Dr. Claypool. Thank you.

Sincerely,

Merwyn Greenlick, Ph.D.
Department Chair
Department of Public Health and Preventative Medicine
Oregon Health Science University

David Claypool
Oregon Health Sciences University
Division of Medical Informatics and
Outcomes Research, School of Medicine
3181 SW Sam Jackson Park Road
Mail Stop BICC
Portland, OR 97201
(503) 494-2388

Appendix 11: Prudent Layperson Fact Sheet Handout

Prudent Layperson

Thank you for filling out the survey. This survey has been designed to help begin to understand how the general, non-medical public makes medical decisions, particularly those involving the use of emergency services.

There is a great deal of effort being made in Congress, the White House, and state governments to pass legislation to protect the public from denial of authorization to seek emergency services by health maintenance organizations (HMOs). In November 1997, legislation was passed within the Balanced Budget Act of 1997 called the Access to Emergency Medical Services Act of 1997. Within this Act, also referred to as the Consumer Bill of Health Care Rights, were guidelines that required payment for emergency medical care by Medicare and Medicaid managed care programs. These guidelines are collectively called the Prudent Layperson standard. The definition of the Prudent Layperson Standard for emergency medical services is: "An emergency medical condition is defined as a medical condition manifesting itself by acute symptoms of sufficient severity (including severe pain) such that a prudent layperson, who possesses an average knowledge of health and medicine, could reasonably expect the absence of immediate medical attention to result in (1) placing the health of the individual (or, with respect to a pregnant woman, the health of the woman or her unborn child) in serious jeopardy, (2) serious impairment of bodily functions, or (3) serious dysfunction of any bodily organ or part." Currently, if a Medicare or Medicaid recipient enrolled in an HMO seeks emergency care anywhere in the United States, those services must be paid for as long as the visit meets the Prudent Layperson Standard.

There is a strong effort being made in Congress, the White House, and state governments to pass similar legislation to protect all others enrolled in HMOs with the same standard. There is currently one large flaw with all this legislative effort; no one has adequately defined who or what a prudent layperson is! Hopefully, the information you provided, when combined with that from other non-medical people, will begin to help us understand how laypeople make decisions about potentially emergency medical conditions. The compiled information can be used to begin to define who prudent laypeople are.

Thank you again for your participation.

Sincerely,

David Claypool, M.D.
Oregon Health Sciences University
Division of Medical Informatics and Outcomes Research
School of Medicine
3181 SW Sam Jackson Park Road
Portland, OR 97201
(503) 494-2388

Appendix 12: Data Coding for Prudent Layperson Surveys

Scenario Questions:

Visual Analog Questions:
C1.1 – C5.1
Values 00 - 99

Time Variable Questions:
Where to go:
2PM
C1.2 – C5.2
I do not need to be seen = 1
I would call or see my regular doctor = 2
I would go to an emergency room now = 3

2AM
C1.3 – C5.3
I do not need to be seen = 1
I would call or see my regular doctor = 2
I would go to an emergency room now = 3

How to get to the ED:
2PM
C1.4 – C5.4
No Answer = 0
Walk or public transport = 1
Call a Cab = 2
Drive yourself = 3
Have someone else drive you = 4
Call 911 for an ambulance = 5

2AM
C1.5 – C5.5
No Answer = 0
Walk or public transport = 1
Call a Cab = 2
Drive yourself = 3
Have someone else drive you = 4
Call 911 for an ambulance = 5

Demographics:

Sex:
D1

Male = 0
Female = 1

Age:
D2
018-99

Prudent Layperson:

Education:
D3.PL
Less than 9th grade = 1
9th to 12th grade, no diploma = 2
High school graduate, G.E.D. = 3
Some college, no degree = 4
Associate degree or trade school = 5
Bachelor's degree = 6
Graduate or professional degree = 7
Other = 9

Been To ED?
D4.PL
No = 0
Yes = 1

Overnight in hospital
D5.PL
No = 0
Yes = 1

Work in health care?
D6.PL
No = 0
Yes = 1

What health care job?
D6.1.PL
Text

PCP?
D7.PL
No = 0
Yes = 1

Covered by Medical Insurance?
D8.PL

No = 0
Yes = 1

If medical insurance, are there co-payments?
D8.1.PL
No = 0
Yes = 1

Chronic Medical Problems?
D8.PL
No = 0
Yes = 1

What are the medical problems?

Heart disease
D9.1.PL
No = 0
Yes = 1

High Blood Pressure
D9.2.PL
No = 0
Yes = 1

Stroke
D9.3.PL
No = 0
Yes = 1

Cancer
D9.4.PL
No = 0
Yes = 1

Epilepsy
D9.5.PL
No = 0
Yes = 1

Lung disease
D9.6.PL
No = 0
Yes = 1

Gastrointestinal disease
D9.7.PL
No = 0
Yes = 1

Kidney Disease
D9.8.PL
No = 0
Yes = 1

Diabetes
D9.9.PL
No = 0
Yes = 1

Arthritis
D9.10.PL
No = 0
Yes = 1

Back Pain
D9.11.PL
No = 0
Yes = 1

Other
D9.12.PL
No = 0
Yes = 1

Number of visits to you physician in last year.
D10.PL
None = 0
1-2 = 1
3-5 = 2
6-10 = 3
>10 = 4

Emergency Physicians

Fields Trained
Family Practice
D3.1.EM
No = 0
Yes = 1
Internal Medicine

D3.2.EM
No = 0
Yes = 1
Obstetrics/Gynecology
D3.3.EM
No = 0
Yes = 1
Pediatrics
D3.4.EM
No = 0
Yes = 1
Emergency Medicine
D3.5.EM
No = 0
Yes = 1
Other (fill in below)
D3.9.EM
Text

Fields Trained year completed
Family Practice
D4.1.EM
1920 - 1999
Internal Medicine
D4.2.EM
1920 - 1999
Obstetrics/Gynecology
D4.3.EM
1920 - 1999
Pediatrics
D4.4.EM
1920 - 1999
Emergency Medicine
D4.5.EM
1920 - 1999
Other (fill in below)
D4.9.EM

Board Status
Family Practice
D5.1.EM
Certified = 1
Eligible = 2
Neither = 0
Internal Medicine
D5.2.EM
Certified = 1

Eligible = 2
Neither = 0
Obstetrics/Gynecology
D5.3.EM
Certified = 1
Eligible = 2
Neither = 0
Pediatrics
D5.4.EM
Certified = 1
Eligible = 2
Neither = 0
Emergency Medicine
D5.5.EM
Certified = 1
Eligible = 2
Neither = 0
Other (fill in below)
D5.9.EM
Certified = 1
Eligible = 2
Neither = 0

Approximate percent of time in practice
Family Practice
D6.1.EM
0.00 – 1.00
Internal Medicine
D6.2.EM
0.00 – 1.00
Obstetrics/Gynecology
D6.3.EM
0.00 – 1.00
Pediatrics
D6.4.EM
0.00 – 1.00
Emergency Medicine
D6.5.EM
0.00 – 1.00
General Practice
D6.6.EM
0.00 – 1.00
Other (fill in below)
D6.9.EM
3) – 1.00

Primary practice setting
D7.EM

Tertiary care medical center = 1
Large community hospital = 2
Public hospital = 3
Small community hospital = 4
Urgent care center = 5
Retired/Not currently practicing = 6
Other = 9

Patient volume at primary practice setting
D8.EM
0-5,000 = 1
5,001-10,000 = 2
10,001-25,000 = 3
25,001 - 50,000 = 4
50,001 - 100,000 = 5
>100,000 = 6

Primary care physicians

Fields Trained
Family Practice
D3.1.PCP
No = 0
Yes = 1
Internal Medicine
D3.2.PCP
No = 0
Yes = 1
Obstetrics/Gynecology
D3.3.PCP
No = 0
Yes = 1
Pediatrics
D3.4.PCP
No = 0
Yes = 1
Emergency Medicine
D3.4.PCP
No = 0
Yes = 1
Other (fill in below)
D3.9.PCP
Text

Fields Trained year completed
Family Practice

D4.1.PCP
1920 - 1999
Internal Medicine
D4.2.PCP
1920 - 1999
Obstetrics/Gynecology
D4.3.PCP
1920 - 1999
Pediatrics
D4.4.PCP
1920 - 1999
Emergency Medicine
D4.4.PCP
1920 - 1999
Other (fill in below)
D4.9.PCP

Board Status
Family Practice
D5.1.PCP
Certified = 1
Eligible = 2
Neither = 0
Internal Medicine
D5.2.PCP
Certified = 1
Eligible = 2
Neither = 0
Obstetrics/Gynecology
D5.3.PCP
Certified = 1
Eligible = 2
Neither = 0
Pediatrics
Emergency Medicine
D5.4.PCP
Certified = 1
Eligible = 2
Neither = 0
Other (fill in below)
D5.9.PCP
Certified = 1
Eligible = 2
Neither = 0

Approximate percent of time in practice
Family Practice

D6.1.PCP
0.00 – 1.00
Internal Medicine
D6.2.PCP
0.00 – 1.00
Obstetrics/Gynecology
D6.3.PCP
0.00 – 1.00
Pediatrics
D6.4.PCP
0.00 – 1.00
Emergency Medicine
D6.5.PCP
0.00 – 1.00
General Practice
D6.6.PCP
0.00 – 1.00
Other (fill in below)
D6.9.PCP
4) – 1.00

Prior ED Experience
D7.PCP
No = 0
Yes = 1

Gatekeeper?
D8.PCP
No = 0
Yes = 1

Volume of gatekeeper authorizations
D8.1.PCP
000 – 999

Primary practice setting
D9.PCP
Tertiary care medical center = 1
Large community hospital = 2
Public hospital = 3
Small community hospital = 4
Urgent care center = 5
Retired/Not currently practicing = 6
Other = 9

Patient volume at primary practice setting
D10.PCP

0-5,000 = 1
5,001-10,000 = 2
10,001-25,000 = 3
25,001 - 50,000 = 4
50,001 - 100,000 = 5
>100,000 = 6

Importance of Issue Question

E1
…, whether it is an emergency or not. = 1
…for conditions that an average person would consider an emergency. = 2
…that my regular doctor authorizes. = 3
…that, after being evaluated, actually was an emergency condition. = 4

Appendix 13: ANOVA for Visual Analog Scale Analysis

ANOVA Table for Case 1 VA

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Survey Group	2	4268.754	2134.377	27.281	<.0001	54.562	1.000
Residual	369	28869.469	78.237				

ANOVA Table for Case 2 VA

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Survey Group	2	62818.768	31409.384	61.550	<.0001	123.101	1.000
Residual	369	188302.221	510.304				

ANOVA Table for Case 3 VA

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Survey Group	2	2734.608	1367.304	1.575	.2084	3.150	.321
Residual	369	320298.554	868.018				

ANOVA Table for Case 4 VA

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Survey Group	2	7263.560	3631.780	4.215	.0155	8.430	.740
Residual	369	317954.913	861.666				

ANOVA Table for VA 5

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Survey Group	2	8514.957	4257.479	37.933	<.0001	75.866	1.000
Residual	369	41415.225	112.236				