Malpractice and Malcontent: Analyzing Medical Complaints in Twitter

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Introduction

Medical error remains a major cause of negative health outcomes (Wachter 2010). Reducing error requires feedback from all stakeholders in the healthcare system, and the World Health Organization singled out the need for patients in particular to take an active role in defining patient safety (Emslie, Knox, and Pickstone 2002). Recognizing the different types of patient safety errors and associated responses is crucial to improving healthcare and avoiding errors. However, it is difficult to obtain patient feedback and current methods of obtaining patient safety data via self-reported patient feedback are incomplete (Ward and Armitage 2012).

Recent studies have used social media for collecting patient-reported health information, e.g. influenza detection (Culotta 2010), analysis of dental pain (Heaivilin et al. 2011), and a variety of other public health issues (Paul and Dredze 2011). Since users often express frustration and complain using social media, we can learn about patient perspectives on medical error by examining these data for self-reported adverse medical events.

In this paper we report preliminary results from a study of Twitter to identify patient safety reports, which offer an immediate, untainted, and expansive patient perspective unlike any other mechanism to date for this topic. We identify patient safety related tweets and characterize them by which medical populations caused errors, who reported these errors, what types of errors occurred, and what emotional states were expressed in response. Our long term goal is to improve the handling and reduction of errors by incorporating this patient input into the patient safety process.

Identifying Patient Safety Mentions in Twitter

To find messages about patient safety, we collected tweets using Twitter's search API from December 2011 to February 2012. We queried key phrases (Table 1) which were selected by three researchers and reviewed by a patient safety expert, and researchers reviewed the matching tweets for relevance to patient safety. This targeted Twitter crawl yielded data

Phrase Groups		
A	**B**	**C**
sue the	hospital surgeon nurse doctor	screwed up fucked up messed up made a mistake was wrong mistake gave me the wrong error
Phrase Patterns		
A B		
B C		

Table 1: Search queries used to identify patient safety messages. Queries are formed by generating phrases of the form "A B" or "B C"; e.g. "sue the doctor" or "nurse screwed up."

with higher occurrences of patient safety information.[1]

Among the results returned by our search, annotators were asked to identify patient safety tweets, using the following criteria:

1. Does the statement explicitly express a 1) preventable AND 2) adverse (not as originally intended) event? (mistake, screw up, mess up)

2. Is the event 1) care-related (health condition, symptoms, organ system) AND 2) explicitly ascribed to actions of health professional or procedure (doctor, pharmacist, surgeon, operation, prescription)?

3. Does the statement refer to the patient safety incidence in relationship to the person at-hand or someone personally known by that person?

Researchers reviewed the first 770 tweets from our collection and identified 170 (22%) that met these criteria. Each tweet was independently reviewed by two annotators and, in the case of a disagreement, a third annotator was consulted. Additionally, identified tweets were categorized by reporter role, error source, error type, and response type.

[1]We initially experimented with identifying tweets using high recall (i.e. more permissive) keywords on a large sample of Twitter data. However, the true positive rate was very low. The key phrases in Table 1 were created based on the initially discovered messages. None of the messages considered in this paper were from these initial experiments.

Reported By	Percentage	Error Source	Percentage	Error Type	Percentage	Error Emotion	Percentage
Patient	80.6%	Surgeon	18.1%	Surgical	7.2%	Unknown	47.1%
Relative	8.0%	Doctor	51.5%	Diagnostic	15.0%	Anger	22.2%
Friend	1.1%	Nurse	18.7%	Medication	22.2%	Humor	10.5%
Colleague	0.0%	Pharmacist	0.0%	Procedure	36.5%	Sadness	5.9%
Other Patient	2.3%	Other Medical	4.7%	Infection	0.0%	Relief	6.5%
Medical	0.0%	Dentist	0.0%	Communication	9.6%	Disbelief	7.8%
Unknown	8.0%	Unknown	7.0%	Unknown	9.6%	Prayer	0.0%

Table 2: The distribution of the source of the error mention (i.e. the Twitter user), the source of the error, the error type, and the error response (i.e. the emotion associated with the error mention).

Results and Analysis

Of the 170 identified patient safety tweets, 81% were self-reported, 9% were reported by a family member or friend, and 10% were reported by a third-party source (i.e., colleague, another patient, medical provider) or an unknown source. The most frequently stated error type was procedural error (37%) followed by medication error (22%). Physicians were identified as the error source most frequently (51%) followed by nurses (19%) and surgeons (18%). Most users did not state their life response (i.e. intended follow-up) to the adverse event, however, 7% stated intent to sue a hospital or provider.[2] Table 2 summarizes the results. Examples of the types of tweets analyzed in our study include:

- The nurse messed up so now she gotta draw more of his blood. Smh

- One of my residents was admitted to die because a surgeon messed up on her back surgery and she's only 43.

- REALLY?! my doctor screwed up my prescription... I've been taking the wrong dosage for almost a year. HMM. MAYBE THAT EXPLAINS SOMETHING.

These tweets highlight a procedural error by a nurse with an emotional disbelief (smh = shaking my head); a surgical procedure error expressed by third-party; and a physician prescription error that lasted over a year. What is evidenced by this is that patients are expressing their patient safety experiences on Twitter. Capturing these patient perspectives can fuel a new era of patient-centered improvements.

Discussion

Our study found that patient safety events are primarily self-reported or relative-reported, demonstrating the potential for learning patient perspectives from Twitter. Additionally, we were surprised to find many serious errors (e.g. surgical), some of which the user said could result in death. Since most patient safety strategies revolve around physicians and surgeons, these Twitter data could bring a unique patient perspective to the errors caused by nurses, physicians and other health care team members. Future studies will examine strategies for entire health care teams to improve patient safety based on this unique patient perspective.

Our study also found that patients and relatives reacted to safety errors in a wide variety of manners. While some patients expressed anger and frustration in response to errors, others found the errors humorous and had an easy time moving on from them or used humor as a potentially effective coping mechanism for errors. A small portion of the tweets (7%) cited malpractice as a possible outcome for the error. It is important to understand why patients and their families exhibit these different emotions and how these responses can be better communicated between patients and their families and health care professionals. For example, new healthcare training to target emotional interactions between patients and health care professionals could decrease the number of disgruntled patients and families that suffered a safety error. Since errors were self-reported and reported via family members, it is important to differentiate between the various emotional responses to determine how to ensure all members of the patients team are aware of the error and satisfied with the health care response to the error.

While the implications for patient safety are exciting, this work has some limitations. First, the Twitter user population, or the population writing about medical errors, may not be representative of the general population. Additionally, our techniques so far have only yielded a limited number of patient safety messages. As of yet, we do not know if these limitations are inherent to the data or our collection and analysis methods. Our next steps will include further quantitative analysis to assess Twitter's utility as a source for patient safety events and patient-generated data.

References

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[2] We obviously cannot verify actual action or if the user intends to actually pursue the action.