Patient-Generated Serial Photos of Surgical Wounds Following Discharge to Guide Clinical Decision Making

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Background

Postoperative, postdischarge surgical site infections (SSIs) pose problems which may be serious for patients and costly for providers and healthcare organizations (HCOs). These include: hospital readmission, morbidity and mortality from infections, and challenges of care coordination (Johns Hopkins University, 2010). The patient may be unable to accurately identify if they have a wound infection, leading to potentially unnecessary and costly emergency room visits or a potential delay in receiving care. More than 300,000 SSIs are reported annually, with an estimated cost of $3-10 billion annually falling mainly on hospitals and payors, and due to increased length of stay and increased risk of patient morbidity (Evans, 2015). While patients can be monitored closely for infections in the hospital, at present “no standardized or reliable method for post-discharge surveillance has been established” (Anderson et al., 2008). As such, potential postdischarge SSIs may result in inappropriate use of hospital resources due to unnecessary emergency room visits or potentially a delay in the diagnosis of a wound infection if the patient is unable to recognize the signs and symptoms of the same. The latter further contributes to the increased risk of patient mortality if the diagnosis is made too late and also results in further burden on hospital resources and contributes to the massive annual cost of postoperative SSIs. The mPOWER (mobile PostOperative Wound Evaluator) system was developed within an academic medical center, and addresses this lack of post-discharge wound monitoring by giving providers access to the daily trends in the patient’s wound healing through photos and a structured symptom survey, both uploaded by the patient from their smartphone (Lober, 2014).

Case Presentation

mPOWER is a secure, mobile app that allows patients to complete a SSI symptoms survey and upload photos of their wound. It is coupled with a secure, web-based application that allows providers to view images and clinical data on a provider-specific platform’s dashboard. Members of the patient’s surgical team can view, share, and discuss a longitudinal history of the patient’s wound healing through the photos and symptoms. At present this is implemented outside of the HCO’s Picture Archiving Systems (PACS). This information may be used to guide clinical care decisions about the next steps in the patient’s care, or to reassure the patient if appropriate.

Outcome

mPOWER is implemented using open source tools and development platforms. Its functions reflect participatory design by both patients and providers (Sanger et al., 2014). It has been evaluated through usability testing, and is being deployed initially in an academic reconstructive surgery center.

Because the photos are acquired and uploaded by patients and caregivers, image quality is an uncertain and potentially important issue. At present, we have included instructions to improve photo quality, such as...
lighting and distance, on patient handouts. A 10 centimeter ruler is also provided to patients during their training, and its incorporation in the image is encouraged. The topic of image quality will be assessed in greater detail as data uploaded through mPOWEr accumulates.

Postoperative care and postdischarge communication, inherently interdisciplinary efforts, are jointly undertaken by doctors and nurses. Particularly in academic centers, coordination among multiple care teams, and across the inpatient and outpatient settings, is challenging. mPOWEr has been designed and built, and is being implemented, by a rich interdisciplinary team of doctors, nurses, patients, and technologists.

Discussion

mPOWEr encapsulates several important trends: the use of non-radiographic images for clinical decision making, the incorporation of patient-generated image data into HCO records, and the rapid growth of mHealth applications for both patients and providers. Our current work is exploring both the predictive characteristics of clinical data in SSI, as well as scenario-based testing of the ability of clinical providers to make wound management decisions based on a combination of clinical and image data. There remain many unanswered questions, such as the relative contributions of image quality and longitudinal data to decision making.

The demonstration will consist of elective use by conference attendees of both the mobile app and the dashboard, and will highlight the issues of patient-generated data and loosely controlled acquisition of image data for clinical decision making. The authors hope to benefit from further discussion of the role of PACS in these novel image applications.

Conclusion

At present, no standard exists for monitoring postoperative wound healing after discharge for the development of SSI. mPOWEr aims to provide patients and providers with a secure platform on which to upload and view serial non-radiographic images and information on symptoms. With this data, providers can remotely monitor surgical wound healing and assess for and act on any necessary changes in the patient’s treatment regimen that may arise.

References

Keywords

SSI--Surgical Site Infection, Post-Operative, Wound Infection, Patient-Reported, Outcomes, mHealth