Author's response to reviews

Title: A real time locating system observes physician styles during walk-rounds: a pilot study

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Author's response to reviews: see over
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Dear Editors,

Thank you for inviting us to resubmit our paper MS: 8706089519118221 entitled “A real time locating system observes physician styles during walk-rounds: a pilot study”.

In this cover letter, we address each comment made by the editorial team and provide an itemized listing of the subsequent changes in the manuscript. Our responses are outlined in italics. We have also submitted the revised version of the manuscript written in consideration of the constructive and helpful comments from the 2 referees with the major changes highlighted in yellow.

We thank you again for this opportunity to revise and resubmit this paper and hope that our work meets your expectations.

Yours sincerely,

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JBL/ tc
Reviewer Dr. Scott Wright

1) This technology should have allowed many physician-teachers to be followed on multiple days of rounding. Instead, a very small number of physician-teachers were followed on 1 morning.

Authors’ response: We have clarified throughout the document that this research is a small scale pilot study, and a sub-study of a program of research validating the RTLS technology. We saw an opportunity to use this novel technology to gather information about the movement of physicians during their rounding events in an academic setting. Given that “rounds” describe a very heterogeneous collection of events, we targeted one specific weekly rounding event in order to attempt to standardize the data collection setting: a mandatory once-weekly medical teaching team patient care rounding session endorsed as a walk-rounds format. We have added documentation to clarify this point in the manuscript. The reviewer's important suggestions have been added to a segment on future research direction.

Page 2 abstract background: We used RTLS technology in a clinical setting to observe and track patterns of movement of attending physicians during a mandatory once-weekly medical teaching team patient care rounding session endorsed as a walk-rounds format.

Page 2 abstract methods: During a project to assess the efficacy of RTLS technology to track equipment and patients in a clinical setting, we conducted a small-scale pilot study to observe attending physician walk-round patterns during a mandatory once-weekly team rounding session.

Pages 5-6 methods section: Attending physicians may differ widely in the timing, frequency, and style of their patient care rounds based on various factors such as personal preference, day of week, patient load and number of overnight admissions. At our institution, the attending physicians on the MTU are expected to incorporate a mandatory once-weekly medical teaching team rounding session into their schedule, the timing of which is at their discretion. The recommended format for these rounds is that of walk-rounds with bedside teaching. Typically, each attending physician is responsible for the care of 15-20 patients.

Page 11 discussion section: In this pilot-study we used RTLS technology to observe the real world patterns of movement of attending physicians on an internal medicine service during a mandatory once-weekly medical teaching team patient care rounding session endorsed as a walk-rounds format.

Pages 12-13 discussion section: The RTLS technology offers many opportunities for future research in the realm of medical education and health care delivery. For example, a large number of attending physicians could be observed during informal and scheduled rounding events. Data could be collected varying the day, times of day,
patient care loads, and types of learners. There is the additional opportunity to assess efficiency or redundancy of attending physician movement such as how often attending physicians revisit a specific room or retrace their steps. The observed patterns of movement could be linked to outcomes such as patient and learner satisfaction scales in an effort to give insight into the optimal rounding strategy. The RTLS technology could also be used in combination with other research tools such as video ethnography to document what is actually done and discussed in the patient rooms, hallways and conference rooms.

Page 13 discussion section We also acknowledge that the inherent variability in the number and acuity of patients, skill of learners, and other factors can alter physician behaviours during walk-rounds.

2) Because there was an observer following the physician-teachers around, the rtls was not needed, it added little.

Authors’ response: We have clarified in the methods section that the attending physicians were not followed by an observer. The insight into the movements of the physician-teachers was provided solely from the plotting of time-motion data obtained from the RTLS. In the discussion we address how this technology versus a direct ethnographic observation of attending physicians during rounds may lessen the Hawthorne effect.

Page 6 methods section: Participants notified the research team in advance of when the rounding session was to occur. Each physician was then provided with an RTLS identification tag to wear during the rounds, and confirmed the start and stop times of each rounding event when they returned the tags to the investigators. The investigators did not follow the attending physicians during the study period and the time-motion data was obtained solely from the RTLS data.

Page 13 discussion section: We note that despite a lack of concurrent direct human observation there was the potential for the Hawthorne effect as physicians may have altered their rounding patterns knowing that they were being tracked via the RTLS system.

3) Useful results might have included things like the frequency of revisiting a specific room, or the frequency of retracing steps (e.g. seeing one patient in the west wing, then seeing a patient in the east week, and then returning to the west wing = inefficient walking / rounding).Such data was not included.

Authors’ response: The original focus of the study was to test out the RTLS technology in this medical education setting and to look for attending physician patterns of movement during the rounding events. Based on the reviewer's comments, we revisited the data set and were able to provide an estimate of how often the attending physicians retraced their steps. The RTLS technology uses color to add chronology to the time-motion study (explained on page 7). As stated on page 7 of the original manuscript,
there is a margin of error of two meters for any plotted point thus eliminating the possibility of exactly retracing steps. We have added a small section in the results and discussion to reflect these additional data. The reviewer’s important suggestions have also been added to a segment on future research direction.

Page 10 results section: Of the total distance covered during this event, approximately 30% comprised an overlapping path.

Page 10 results section: Of the total distance covered during this event, approximately 40% comprised an overlapping path.

Page 10 results section: Nearly 50% of the distance travelled comprised a path that overlapped distances previously travelled.

Page 11 results section: Of the total distance covered during this event, approximately 30% comprised an overlapping path.

Page 12 discussion section: This pilot study also offers a preliminary description of physician workflow patterns where up to 50% of the distance travelled during the rounds comprised overlapping paths, suggesting at least some level of movement inefficiency.

Page 13 discussion section: There is the additional opportunity to assess efficiency or redundancy of attending physician movement such as how often attending physicians revisit a specific room or retrace their steps.

4) In the figures, it is not possible to see or make sense of the pattern or the path that the physician-teacher took. The authors’ belief that patterns or styles could be detected is not appreciated by this reviewer.

Authors’ response: The reviewer’s concern emphasizes why the data analysis/interpretation relied on prior experience with the RTLS as outlined on page 8. In addition, that is why we supplied a text description as a key supplement to the figures so that the readers can have a better sense of the attending physician trajectory. We have expanded the manuscript accordingly in acknowledgment of the reviewer’s comments.

Page 9 results section: We present pictorial data from four physicians as visual examples of the three patterns of movement as captured by the RTLS. (Figure 2) In addition, we supply a description in text as a key supplement to the figures so that the readers can have a better sense of the attending physicians’ movements. Poor quality pictorials from the other rounding events illustrating similar results are not presented due to technological limitations where the RTLS system placed the data points on multiple slides or displayed data in a connecting pattern that increased the difficulty of visual data interpretation.
5) In the Methods and Results, the authors’ failed to provide details about the day in the ‘cycle’ the rounding was being observed. The reviewer, who serves as a physician-teacher on an inpatient unit at a big academic institution, rounds differently and would be said to have a different style depending on the day that I was observed with my team (on call, post call, ‘good’ day...).

Authors’ response: This critical information has now been added to the manuscript. Please see the earlier response to comment 1 where we have added detail about the rounding events that we sampled.

6) The assumption of different styles that the physician-teachers have seems like an oversimplification of the truth and a misinterpretation of a very small amount of data (watching just a few physician-teachers on 1 morning)

Authors’ response: We certainly agree and did not intend to overstate the importance of the results of this small-scale pilot study testing a novel technology. Rather, we believe that this is an interesting and valuable descriptive piece that relates to attending physician rounding styles and part of a broader program of work that addresses a component of technological validation for the RTLS system. We believe that the insight gleaned from tracking the attending physician movements with the RTLS tags although preliminary, is still notable from a medical education perspective. This introductory evidence opens the door to opportunities for future research. We have rewritten the conclusion section to reflect these thoughts.

Page 14 conclusion section: We believe that this small-scale pilot study, as part of a broader program of work studying the usefulness of RTLS technology within health care systems, allows an interesting and valuable preliminary description of attending physician rounding styles, thus introducing potential relevance of this technology to the field of medical education. RTLS technology allowed us to observe and track the patterns of movement of attending physicians during their rounds without observer interference, and three styles of movement were identified; more may exist. Future research could explore the reasons for these differences, which rounding approaches are suitable for what types of teaching and learning, which are more acceptable to patients and other effects of the different attending rounding styles on health care delivery and medical education.

Reviewer Dr. Gordon Caldwell

1) The only slight problem that I have is in the reporting of the number of participants. Under Methods I think the authors should make more clear that 8 physicians participated and that the behaviours of four are reported in more detail.”

Author response: We have clarified this point in the methods and results sections.
Page 6 methods section: We present summary results from the eight participants, with additional detailed pictorial results of four participants in order to portray the identified rounding styles.

Page 9 results section: We present pictorial data from four physicians as visual examples of the three patterns of movement as captured by the RTLS. (Figure 2) In addition, we supply a description in text as a key supplement to the figures so that the readers can have a better sense of the attending physicians’ movements. Poor quality pictorials from the other rounding events illustrating similar results are not presented due to technological limitations where the RTLS system placed the data points on multiple slides or displayed data in a connecting pattern that increased the difficulty of visual data interpretation.

2) It would be of interest to know how many patients were reviewed on the walk-rounds, although they may not have the data?

Authors’ response: Although we did not collect these data, we have edited the manuscript to reflect that an attending physician would typically be responsible for 15-20 patients and recognized that the lack of this data in our study is a limitation.

Page 6 methods section: Typically, each attending physician is responsible for the care of 15-20 patients.

Page 13, discussion section: Lastly, although the RTLS technology removed potential observer bias, it did not provide the opportunity to document other factors such as the number of patients visited per event and if bedside teaching occurred while bedside rounding; but this was not an a priori objective of the current work.

3) I was interested that the average on a teaching round was just 33% in the room –this matches pretty much the proportion of my rounds spent at the bedside and my rounds are business rounds. The follow up study could use Video Ethnography to see what is done in the room and what is discussed and done in the hallway and conference room (e.g. could use a GoPro camera system?).

Authors’ response: These are important considerations for future research and we have incorporated them into the manuscript.

Page 12 discussion section: The RTLS technology offers many opportunities for future research in the realm of medical education and health care delivery. For example, a large number of attending physicians could be observed during informal and scheduled rounding events. Data could be collected varying the day, times of day, patient care loads, and types of learners. There is the additional opportunity to assess efficiency or redundancy of attending physician movement such as how often attending physicians revisit a specific room or retrace their steps. The observed patterns of movement could
be linked to outcomes such as patient and learner satisfaction scales in an effort to give insight into the optimal rounding strategy. The RTLS technology could also be used in combination with other research tools such as video ethnography to document what is actually done and discussed in the patient rooms, hallways and conference rooms.

4) These various styles are well known in medicine, but have not been properly defined up to now. I think this should be published to then allow us to open up the walk-round (teaching round) to further study of which approaches are suitable for what types of teaching and learning, and which are more acceptable to patients.

Authors’ response: These are important considerations for future research and we have incorporated them into the manuscript.

Page 14 conclusion section: We believe that this small-scale pilot study, as part of a broader program of work studying the usefulness of RTLS technology within health care systems, allows an interesting and valuable preliminary description of attending physician rounding styles, thus introducing potential relevance of this technology to the field of medical education. RTLS technology allowed us to observe and track the patterns of movement of attending physicians during their rounds without observer interference, and three styles of movement were identified; more may exist. Future research could explore the reasons for these differences, which rounding approaches are suitable for what types of teaching and learning, which are more acceptable to patients and other effects of the different attending rounding styles on health care delivery and medical education.