

# MOBILE TELEPRESENCE TO ADMIT PATIENTS IN THE EMERGENCY ROOM

## “A Remote Hospitalist Study”

### WHITE PAPER

#### EAGLE HOSPITAL PHYSICIANS, L.L.C.

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**Abstract**    **Background:** Demand for Hospitalists has far exceeded supply; this supply problem is exacerbated in rural communities where it is difficult to recruit Hospitalists or Specialists. This study proposes that remote admissions by Hospitalists can help address this need.

**Methods:** The ability to perform remote admissions was assessed with a prospective observational study. ICU admissions and patients with altered mental status were excluded. The study group of patients was admitted remotely and the control group was admitted in person. Times studies were used to evaluate efficiency of admissions. Surveys of Patients, Hospitalists, Emergency Department (ED) Staff, and of the extenders performing the physicals were gathered to assess satisfaction. Hospital length of stay, and compliance with other Hospital core measures were obtained.

**Results:** 22 Patients were admitted by Remote Presence. The time taken to perform remote and in person admissions was comparable ( $P > 0.005$ ). Surveys of Patients and Hospitalists indicate an excellent experience with remote admissions. Key Hospital metrics are similar, including LOS, order set compliance, and DVT prophylaxis. ED Physicians and Nursing Staff were comfortable with the Remote Presence. There was no interference with ED processes.

**Conclusion:** Remote Presence is capable of performing admissions in the ED. Mechanisms must be in place to address procedures and the need for in house back up

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## INTRODUCTION

For the foreseeable future the demand for Hospitalists greatly exceeds the supply and novel solutions are needed to meet this demand (1). This problem is compounded in rural communities where it is challenging to recruit both Hospitalists and Specialist Physicians (2). Telemedicine has been used for a rapidly growing number of applications in healthcare. This allows for a Physician or other provider to be remotely located from the point of patient care. The design of this trial was to assess the ability of Hospitalist physicians to provide initial remote evaluations (known by healthcare providers as the History and Physical or H&P, and includes initial orders and documentation) for Patients in the emergency room. Using remote presence a Hospitalist would be able to be located in one place and provide Hospitalist services virtually anywhere. This evaluation utilizes the InTouch RP-7 mobile Remote Presence equipped with the available electronic stethoscope accessory. The InTouch Health telemedicine platform has been shown to be useful and safe in for stroke evaluation in the emergency room, for in-hospital rapid response evaluations, and for critical care rounding on patients(3)(4)(5)(6). The InTouch Health “robot” has the capability to perform histories and, in conjunction, with an extender (see methods) to perform a complete physical. With this History and Physical capability, a Hospitalist now has the ability to perform remote evaluations in the emergency room and generate initial admission orders.

## METHODS

### *Eligibility and study design:*

This trial was designed as a prospective, open observational study. The evaluation was performed in the Emergency Department (ED) of Saint Joseph’s Hospital in Atlanta, Georgia and in the MAXcare eICU facility located in an adjacent building (The ED is approximately a 3-4 minute walk from the eICU). Eligible patients were identified and consented by a Hospitalist Administrator and enrolled in the study at their discretion. The Hospital Administrator was either the Medical Director or the Assistant Medical Director of the Hospitalist program at Saint Josephs Medical Center. Patients specifically excluded from the study included patients admitted to the intensive care unit and patients with evidence of dementia or delirium. The patients were divided into 2 groups

and Patients were assigned to each group by the Administrator. The first group included the study remote evaluations and the second group the in person Hospitalist History and Physicals. The in person H&Ps served as the control arm of the study. All study evaluations were performed from 12:00am until 4:00pm weekdays. Eight Hospitalists participated in the study. The Hospitalists performed both the remote evaluations and the in person history and physicals. This was coordinated with the regular Hospitalist admissions by the Hospitalist Administrator. All data was collected onsite by a third party.

### *Remote evaluations:*

The verbal history was obtained by the remote Hospitalist using the InTouch Remote Presence. After the history was taken the remote Hospitalist contacted an extender to perform the physical part of the examination. In this study, the Hospitalist Administrator and, in four cases, a Nurse served as the extender. The extender performed the physical exam for the remote presence in coordination with the remote Hospitalist, allowing for a complete H&P to be performed remotely. After the remote H&P was finished a repeat physical was performed, IN PERSON, by the original remote Hospitalist and any changes in the care plan were documented. When the repeat physical was completed the Hospitalist returned to the remote work station and initial admit orders and a brief H&P were faxed to the ED, completing the admission.

### *Direct (in person) evaluations:*

In person H&Ps were performed the same way as any routine admission by a physician The Hospitalist started at the same work station (MAXcare eICU facility) as the remote evaluation and walked over to the emergency room to perform the admission. A History and Physical was obtained in the presence of the patient. Upon completion of the H&P the physician returned to the eICU start point and faxed initial admit orders, completing the admission.

### *Time studies:*

Both remote and in person evaluations were timed. The start time for each both the direct and the remote evaluations commenced once the Hospitalist (stationed in the eICU) was contacted by the Hospitalist Administrator. For the remote evaluation, the time to complete the verbal history, to contact the extender, time leaving the eICU, to perform the remote physical, to complete the follow-on in

person physical for the remote evaluation were all documented, time back in the eICU and the fax time for initial admit orders were all documented. For the direct evaluation the time leaving the eICU, the time to obtain the in person patient History and Physical (as a single time period), time back in the eICU and the fax time for the initial admit orders were all documented. The end time for both groups was defined as when the initial admissions orders and a summary History and Physical were faxed to the Emergency room from the eICU. The time to complete the remote evaluation was calculated by subtracting the start time and the time taken to complete the follow-on direct physical from the end time. For the assessment in person the time to complete the evaluation was determined by subtracting the start time from the end time.

*Surveys:*

For the remote evaluations the Patient, Hospitalist, ED physician, ED Nurse, and extender were surveyed. With the in person Hospitalist admissions only the Hospitalist and Patient were surveyed. Survey questions included are: 1) Overall how satisfied were you with your experience as a Remote/Direct Physician? 2) Were you able to effectively address the patient's health concerns/questions as a Remote/Direct Physician? 3) Would you be comfortable using Remote Presence for admitting patients in the future? 4) Do you have confidence that you could effectively assess a patient similar to this one as a Remote Physician in the future? 5) Was your interaction as a Remote/Direct Physician without interruption or delays? 6) Was there any difficulty getting the physical performed with the extender? The surveyed were requested to rank questions from between one and five. A one equaled no/never and a five equaled very/yes/always. For questions 1 through 5 (see above) a (5) score (Part A in the Tables) would be the best score whereas for question 6 a (1) score would be best (Part B in the Tables).

*Statistical analysis:*

Where possible the results between the groups were compared using the unpaired t-test.

**RESULTS**

A total of 32 patients were assessed as part of the study. There were 22 remote and 10 direct evaluations. The mean Hospital length of stay was not statistically different between the groups: 3.6

days (range of 3 to 7 days) from the direct admissions and 4.0 days (range of 0 to 10 days) for the remote evaluations ( $p>0.005$ ). There was no mortality in either group. Admitting with Remote Presence does not have a negative impact on Hospital length of stay.

The mean time to complete the total evaluation history and physical between the direct group and the in-person group was very similar with no significant difference ( $P>0.005$ ) (Table 1). Overall, The Remote presence H&P is as efficient as the direct H&P. The time period for the actual verbal history taking and physical exam of the direct evaluation could only be obtained as a single time period. To compare the groups, the time period for the remote evaluations was obtained by summing the time taken for the remote history (mean 9 minutes) added to the remote physical exam performed with the extender (mean 7 minutes) and compared to the single time period of the direct exam. The mean time to complete the remote verbal history and remote physical (performed in conjunction with the extender) was 17 minutes (range 10 to 33 minutes) whereas the comparable direct time period took 16 minutes (range 3 to 39 minutes); This was not statistically different ( $P>0.005$ ) (Table 1). Focusing on the history and physical elements of the H&P (excluding travel time, time to write orders, etc.) still reveals similar efficiency between the groups. The follow on remote Hospitalist physical took a mean time of 8 minutes (range 4 to 12 minutes).

Table 1: Mean times to complete the entire H&P and mean time to obtain the verbal history and the actual physical exam.

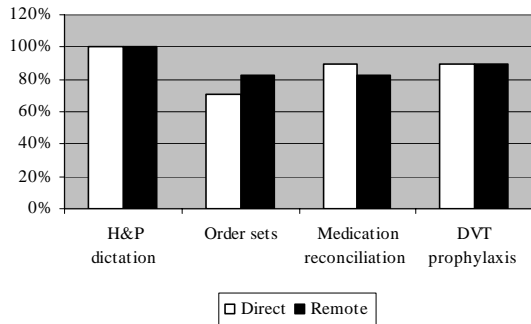
Time period measured	Direct evaluation	Remote evaluation	P Value
Mean time to complete entire admission	50	51	>0.005
Mean time to obtain verbal history & perform physical examination	17	16	>0.005

\*times are in minutes

Both groups had 100% documentation compliance with History and Physical dictations. The order sets were used, when indicated, in 71% of the direct evaluations and in 83% of the remote.

Medication reconciliation was completed in 90% of the direct admissions and 83% of the remote. One remote evaluation patient was directly discharged from the emergency room and thus order sets and med reconciliation were not performed. DVT prophylaxis, where indicated, was given in 90% of the direct and in 90% of the remote cases (Figure 1).

Figure 1: Hospital metrics compliance.



Patients from each group were surveyed and there was no statistically significant difference in the results between the two groups (Table 2). Both groups of Patients gave high marks to the examining Physician. From Table 2 it can be seen that the Patient would be very comfortable with future remote admissions for and that all care concerns were met.

Table 2: Patient survey questions.

Patient Question	Remote Mean	Direct Mean	P Value
<i>Scale 1 to 5, 5 is best</i>			
Overall how satisfied were you with your experience?	4.7	4.8	>0.005
Were your concerns/questions about your health addressed they the Admitting/Remote Physician?	4.8	4.5	>0.005
Would you be comfortable with similar encounters with Admitting/Remote Physicians in the future?	4.9	4.5	>0.005
Was the interaction with the Admitting/Remote Physician without interruption or delays?	5	4.8	>0.005
Was the physical exam performed in a professional manner?	5	4.9	>0.005

Emergency Department Physicians and Nurses were surveyed in the emergency room for the remotely admitted patients by the Hospitalist Administrator (Table 3). Survey results were obtained from ED physicians in 14 of the remote encounters. The ED physician had limited interaction with the remote presence but clearly indicated a very good experience. 12 ED Nurses were surveyed with variable compliance with survey questions. 10 of Nurses surveyed indicated that the remote presence did not interfere in patient care in any way. Two Nurses indicated privacy concerns that were not specific to remote presence – these evaluations occurred in rooms separated by drapes only. Overall the Nurses concerns were met but it is clear that adequate education and in servicing is essential.

Table 3: Survey of ED Physicians and Nurses for remotely admitted patients only.

Survey Question*	ED Physicians	ED Nurses
<i>Part A: Scale 1 to 5, 5 is best</i>		
Were the patient's health concerns/questions addressed by the Remote Physician interaction?	5	4.9
Would you be comfortable with similar encounters with Remote Physicians in the future?	4.7	3.1
Was your interaction with the Remote Physician without interruption or delays?	4.7	4.6
<i>Part B: Scale 5 to 1, 1 is best</i>		
Was there any difficulty with the Remote Physician performing the physical?	2.2	2.7

\*Able to survey ED Physicians for 16 Remote encounters  
 \*Able to survey ED Nurses for 13 Remote encounters

All Hospitalists were surveyed in regards to their experience for remote admissions and direct admissions. There was no statistical difference between the results in each group (Table 4). In addition, the Hospitalists performing remote admissions were questioned on whether the follow up physical changed their management; in no case was

management changed (in one case the Hospitalist was better able to detect hydration status in person but this did translate into actual management change). A post study survey of the eight Hospitalists involved in the study indicated unanimous support for remote presence to perform ED admissions.

Table 4: Survey of Hospitalist admission experience for both remote admissions and direct.

Hospitalist Question	Remote Mean	Direct Mean	P Value
<i>Part A: Scale 1 to 5, 5 is best</i>			
Overall how satisfied were you with your experience as a Remote/Direct Physician?	4.6	4.8	>0.005
Were you able to effectively address the patient's health concerns/questions as a Remote/Direct Physician?	4.8	4.6	>0.005
Would you be comfortable using Remote Presence/Direct Physician for admitting patients in the future?	4.6	4.7	>0.005
Do you have confidence that you could effectively assess a patient similar to this one as a Remote Physician in the future?	4.6	4.4	>0.005
Was your interaction as a Remote/Direct Physician without interruption or delays?	4.7	4.1	>0.005
<i>Part B: Scale 5 to 1, 1 is best</i>			
Was there any difficulty getting the physical performed with the extender?	1.5		

The survey results for extenders who performed the physicals in conjunction with the remote telepresence are shown on Table 5. In all cases, the extender reported an excellent experience with little or no difficulty. Four remote admissions utilized a Nurse as the extender. The time metrics and survey quality scores from the four remote admissions performed with a Nurse extender were comparable with admissions done with Hospitalist Administrator. This suggests that a Nurse, Nurse Practitioner, Physicians Assistant or other provider could serve as the extender.

Table 5: Extender experience with remote physicals.

Extender Survey	Mean Score
<i>Part A: Scale 1 to 5, 5 is best</i>	
Overall how satisfied were you with your experience with the Remote Physician?	5
Were the patient's health concerns/questions addressed by the Remote Physician interaction?	5
Would you be comfortable with similar encounters using Remote Presence in the future?	5
Was the interaction with the Remote Physician without interruption or delays?	5
Was there any difficulty with the Remote Physician performing the physical?	5
<i>Part B: Scale 5 to 1, 1 is best</i>	
Did the Remote Physician interfere with patient care in any way?	1.5

## DISCUSSION

The demand for Hospitalists continues to grow and innovative and robust solutions are needed to meet supply constraints. Telemedicine products have been used for many years but with broadband internet and wireless products now readily available far more capable solutions than ever before are now possible. This convergence of technologies with the demonstration of need has allowed for the development of products such as the InTouch RP-7 Remote Presence Platform. The usability of RP-7 has been shown in multiple healthcare settings ranging from post operative discharge rounds to evening critical care rounds (3)(4)(5)(6). The results of this study suggest that mobile remote presence is a viable method to admit patients. While the study numbers were small over 22 patients were successfully given initial care plans (the H&P) for by a Physician physically located away from the ED in conjunction with an extender who was present in the ED. The patients had an excellent experience and appeared comfortable being admitted by a "Robot". Because of the personal interaction with the remote Hospitalist, via two way video monitor, the patient became much more accepting of the experience.

The Emergency Department is often a chaotic and unpredictable place. Fortunately, the remote presence was found to be unobtrusive and quickly became accepted by the staff. As in any new Hospital/Healthcare related product, appropriate orientation of nursing staff is essential. For example, it was noted by some Nurses during the study that Patients located in rooms separated by curtains had less privacy. This does not appear to be a specific problem of the RP-7 but more of a problem of use of curtains to separate rooms. Nevertheless, nursing concerns about Patient privacy concerns should be addressed by the use of private rooms or by keeping the volume of the RP-7 at an acceptable level.

An important element to this study was the ability to perform a physical with an extender in coordination with the remote Hospitalist. There did not appear to be substantial difficulty in obtaining the physical. The parts of the physical that were harder to assess remotely (for this study one physician had harder time seeing the pupil reflexes, another saw a rash better in person, and a third could assess oral mucosa moisture in person better) did not impact on the care. The RP-7 electronic stethoscope while effective did have some background noise in the loud environment of the emergency room. Ultimately though, the physical yielded the information necessary to generate a care plan and for which the follow on “cross-check” exam did not result in any change. In speaking with the Nurse extender, it appeared that the variation in style of performing between the different Hospitalists involved created more of challenge than doing the actual physical itself. A standardized physical routine and appropriate training for the extenders involved would further streamline the remote admission process.

A critical concern for physicians who utilize Remote Presence for admissions would be the need for procedure coverage. This may be provided by the ED Physician or a Surgeon on call or another Physician depending on how the care operations of the Hospital are set up. Another concern is for the need for in house back up – the worry that a patient may “crash” or decompensate and need to be rapidly evaluated. This may be provided by the ED or in house healthcare staff with or without the support of Remote Presence. The RP-7 has already been successfully for Rapid Response with improved outcomes (4). In addition, there needs to be an appropriate mechanism for the “hand-off” from the remote admitting Physician to the Provider who will continue to care for the Hospitalized Patient. The solutions to these concerns will vary from Hospital to Hospital but can be achieved.

This study excluded patients with altered mental status because that would have eliminated the history component of the remote evaluation. Based on the experience generated via this study, remote evaluations of patients with dementia or delirium could be done without significant difficulty. Admitting critical care patients is certainly a greater challenge. But, as noted before, the RP-7 is already used in critical care settings (6). With the appropriate in house infrastructure and critical care backup it could be possible to admit Intensive Care Patients with Remote Presence.

## CONCLUSION

Mobile Remote Presence is capable of admitting patients through the emergency room. There was no significant care difference between the patients admitted by a Hospitalist in person and the patients admitted remotely. Concerns for In House coverage and procedure needs must be met.

## ACKNOWLEDGEMENTS

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