Cultural acceptance of robotic telestroke medicine among patients and healthcare providers in Saudi Arabia

Results of a pilot study

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ABSTRACT

الأهداف: تَحْديد درجة الرِّضا والقَبُول لدى مَرْضَى السّكْتة الدماغية وأقاربهم ومقدّمي الرعاية الصحّية نحوَ استخدام تكنولوجيا معالجة السّكتة الدماغيّة عن بُعْد في المَملكة العربية السعودية.

الطريقة: أُجريَت دراسةٌ مَقْطعية خلال الفترة ما بين أكتوبر 2012م و ديسمبر 2012م في مدينة الملك عبد العزيز الطبّية، بوزارة الحرس الوطني، في الرياض، المملكة العربية السعودية؛ حيث جرى استخدامُ نظام روبوت بريزنس عَنْ بُعْد (The Remote Presence Robot (RPR، من ماركة RP–7i® (المصرّح به من إدارة الغذاء والدواء الأمريكية FDA)، والمقدّم من إنْتَتْش هيْلث InTouch Health، في الدّراسة. وتمّ إبْلاغ المرضى وأقاربهم بأنّ الطبيبَ سوف يظهرَ من خلال شاشة على أعلى الجهاز الآلي (الروبوت)، وذلك كجُزْء من رعايتهم السّريرية. وقد قام مرضى السّكتة الدماغية، الذين جرى دخولهم من خلال قسم الطوارئ، وأقاربُهم وكذلك مقدّمو الرعاية الصحّية بتعبئة اسْتبْيان شخصي اخْتياري عن الرِّضَا بعدَ جلسات من التّشاور عن بُعْد حول السّكتة الدماغية.

النتائج: أَكْملَ خمسون مشاركاً الاستبيانَ؛ واتّفق معظمُ الأشخاصُ على أنّ المقابلة مع استشاري عن بُعْد كانت مفيدةً، وأنّ العُنْصر السّمْعي البصري للمداخلة كان ذا جودة عالية؛ وأشار ٪98 إلى أنّهم لم يشعروا بالخَجَل أو بالحَرَج خلال المقابلة عن بُعْد، وكانوا قادرين على فَهْم تَعْليمات الاستشاري، وأوصوا باستخدام هذه الطريقةَ في تدبير السكتة الدماغية. وعلاوةً على ذلك، وافق ٪92، أو وافقوا بشدّة، على أنّ استخدامَ هذه التكنولوجيا يمكن أن يحل بكفاءة محلّ الوجود أو الحضور المادّي لطبّيب الأعصاب.

الخاتمة: تشير النتائجُ إلى أنّ استخدامَ علاج السكتة الدماغية عن بُعْد يعدُّ مَقْبولاً ثقافياً بين مرضى السكتة وأسرهم في المملكة العربية السعودية، وقد لقِيَ ترحيباً من قِبَل مقدّمي الرعاية الصحّية.

Objectives: To determine the degree of satisfaction and acceptance of stroke patients, their relatives, and healthcare providers toward using telestroke technology in Saudi Arabia.

Methods: A cross-sectional study was conducted between October and December 2012 at King Abdulaziz Medical City, Ministry of National Guard Affairs, Riyadh, Saudi Arabia. The Remote Presence Robot (RPR), the RP-7i® (FDA- cleared) provided by InTouch Health was used in the study. Patients and their relatives were informed that the physician would appear through a screen on top of a robotic device, as part of their clinical care. Stroke patients admitted through the emergency department, and their relatives, as well as healthcare providers completed a self-administered satisfaction questionnaire following the telestroke consultation sessions.

Results: Fifty participants completed the questionnaire. Most subjects agreed that the remote consultant interview was useful and that the audiovisual component of the intervention was of high quality; 98% agreed that they did not feel shy or embarrassed during the remote interview, were able to understand the instruction of the consultant, and recommended its use in stroke management. Furthermore, 92% agreed or strongly agreed that the use of this technology can efficiently replace the physical presence of a neurologist.

Conclusion: Results suggest that the use of telestroke medicine is culturally acceptable among stroke patients and their families in Saudi Arabia and favorably received by healthcare providers.

Neurosciences 2015; Vol. 20 (1): 27-30

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Received 12th December 2013. Accepted 3rd November 2014.

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Intravenous tissue plasminogen activator (t-PA) within 4.5 hours of symptoms onset was shown to be effective in the management of acute ischemic stroke.[1,2] In addition to t-PA delivery, advanced procedures performed by neuro-endovascular interventionalists have given hope for additional effective therapies for patients suffering from ischemic stroke.[2,3] These interventions are time sensitive and require management by specialized stroke and brain imaging experts. Unfortunately, only small percentages of patients receive such therapies due to several factors, such as delayed presentation to the emergency department (ED), lack of availability of neurological expertise on an emergent basis, and geographical proximity of patients to the expertise.[2,4] Both, the scarcity of stroke expertise and the large underserved community of people living outside major metropolitan areas are probably the top 2 major challenges for acute stroke care in Saudi Arabia. The use of interactive full-motion audio and video technologies for acute stroke care (telestroke) are an alternative mode to overcome the aforementioned challenges.[5] The American Heart Association guidelines recommended telestroke as an alternative means to evaluate acute stroke patients, review images, and provide a medical opinion in favor of or against the use of intravenous t-PA in patients with suspected acute ischemic stroke when on-site stroke expertise is not immediately available.[6,7] Nevertheless, there can be some social barriers toward the use of telestroke technology in Saudi Arabia. Since it works through a robot carrying a videocam, it is possible that the patient may object to being taped, diagnosed, or treated through a robot. Besides, health providers might not comfortably conduct a proper remote diagnosis or treatment. The purpose of this study is to determine the degree of satisfaction and the cultural acceptance of stroke patients and their relatives as well as healthcare providers including physicians, nurses, and staff toward using telestroke technology in Saudi Arabia.

Methods. We conducted this pilot study between October and December 2012 at King Abdulaziz Medical City, Ministry of National Guard Affairs, Riyadh, Saudi Arabia. The purpose of the study was to prove the technical feasibility and cultural acceptance of telemedicine prior to the implementation of telestroke in the National Guard Health Affairs, as part of a stroke management improvement project. The Remote Presence Robot (RPR), the RP-7i® (FDA-cleared) provided by InTouch Health (Santa Barbara, CA, USA) was used in this study. By combining remote control robotics and remote presence technologies, the RP-7i® allows a remote clinician to see and interact with patients and staff while proactively and independently managing care delivery just as if they were physically present on-site. During the pilot study, stroke neurologists provided routine consultations in the ED and conducted daily rounds in the stroke unit with the interdisciplinary stroke team. The patients and their relatives were informed that the physician would appear through a screen on the top of a robotic device, and that was part of the clinical care. Patients and family members were given the option to refuse to participate in the interview via robotic device if they wish to do so. A convenient sample of all consecutive stroke patients (and relatives) admitted to the stroke unit through the ED during the study period completed a self-administered satisfaction questionnaire at the end of the telestroke consultation session. At the end of the pilot study, the interdisciplinary stroke team members (physicians, nurses, physiotherapists, occupational therapists, and so forth) also completed the satisfaction questionnaire. The questionnaire used a Likert scale of 7 items that assessed participants' opinion and satisfaction on the usefulness of the robotic telestroke consultation session, feelings of being embarrassed, shy, or uncomfortable during the interview, audiovisual quality, ability to understand the information provided by the stroke neurologist during the interview, the necessity of the physical presence of the stroke neurologist, whether the participant recommend such technology to be adapted in the country, and the overall satisfaction of the telestroke. Items one to 6 had 5 possible responses (strongly agree, agree, neutral, disagree, and strongly disagree), while item 7 had 5 responses (strongly satisfied, satisfied, neutral, dissatisfied, strongly dissatisfied). The satisfaction questionnaire, which was in Arabic, was locally generated by consensus between 4 scientists in the fields of neurology and research methodology, but with no formal validation on study participants. Data was analyzed using the Statistical Package for Social Sciences (version 21) (IBM SPSS Statistics for Windows, IBM Corp, Armonk, NY, USA) software. Frequency tables were used to depict results related to description of the study population and their level of satisfaction with the robotic telestroke consultation. The 95% confidence interval (CI) was used to estimate the level of precision of the mean satisfaction score. A p-value of <0.05 was taken to indicate statistical significance. The study was approved by King AbdulAziz Medical City Authorities as a pre-requirement to implement telestroke medicine in the medical city.

Disclosure. The authors declare no conflicting interests, support or funding from any drug company.

Table 1 - General descriptive statistics of the stroke patients, their relatives, and healthcare providers participating in the survey (N=50).

Variable	Frequency	(%)
Gender		
Male	20	(40)
Female	30	(60)
Occupation/status		
Patient	13	(26)
Patient's relative	14	(28)
Nurse	16	(32)
Physician	3	(6)
Others	4	(8)

Table 2 - Level of satisfaction with the Robotic link survey, using Likert scale among 50 stroke patients, their relatives, and healthcare providers.

Variable	Frequency	(%)
Was the interview useful?		
Agree	16	(32)
Strongly agree	34	(68)
The interview was not embarrassing		
Neutral	1	(2)
Agree	18	(36)
Strongly agree	31	(62)
The picture and sound were clear		
Agree	14	(28)
Strongly agree	36	(72)
Information given by the neurologist was clear		
Neutral	1	(2)
Agree	21	(42)
Strongly agree	28	(56)
The physical presence of the neurologist was not needed		
Disagree	2	(4)
Neutral	2	(4)
Agree	18	(36)
Strongly agree	28	(56)
I recommend the use of this technology		
Neutral	1	(2)
Agree	12	(24)
Strongly agree	37	(74)
Overall Satisfaction after the interview		
Satisfied	20	(40)
Very satisfied	30	(60)

Results. Among the 50 participants, 60% were women, and 54% were either patients or relatives, while the remaining were health care providers from different disciplines (**Table 1**). The mean age was 39±13 years (mean age of patients 53±12). The overall satisfaction of the robotic telestroke sessions was very high among participants (**Table 2**). One hundred percent was either satisfied (40%), or strongly satisfied (60%). Also, 100% of participants agreed (32%), and strongly agreed (68%) on the usefulness of the interview through robotic telestroke. Thirty-six percent of the respondents agreed, and 62% strongly agreed that they did not feel shy or embarrassed during the remote interview with the consultant. Further, 72% strongly agreed, and 28% agreed on the high quality of the audiovisual component of the robotic telestroke. Ninety-eight percent could clearly hear and understand the instructions provided by the treating consultant through the telestroke. When the participants were asked to confirm that the on-site presence of the stroke neurologist was not necessary for the care process, 56% strongly agreed, 36% agreed, and 8% either disagreed or were neutral. Finally, 98% of the participants recommended the adoption of such technology in the country (**Table 2**). A sum satisfaction score for the 7 survey items was computed to get an overall satisfaction score for the use of robotic technology in patients' management. The whole surveyed population got a mean score of 32.3 (95% CI: 23.1-41.5) out of a total maximum score of 35 with a standard deviation of 2.5 points. In addition, subgroup analysis did not show a statistically significant difference in satisfaction between men/women (p=0.21), health care providers/patients and relatives (p=0.33).

Discussion. Stroke is a leading cause of death and carries significant morbidity.[8] Despite the new advancement in the field, stroke care in Saudi Arabia lags behind developed countries with only 7 centers providing thrombolysis among more than 350 hospitals nationally; in which only 2 hospitals have a stroke team with implemented triaging pathways and beeper system.[9] This is due, among many other reasons, to the shortage in healthcare professionals trained in stroke management and geographic limitations. These challenges can be largely resolved by telestroke medicine. Many studies showed that telemedicine could be used to deliver stroke care to areas without expertise,[10] by providing 24/7 access to neurologists for institutions that lack such services.[11] With proven safety, telemedicine increases the use of thrombolytic therapy in hospitals without an on-site neurologist and improves the overall quality of care.[12] With these facts in mind, there is an urgent need to redesign the care delivery systems within Saudi Arabia to incorporate technologies like telemedicine, to guarantee that stroke patients receive the best evidence based care they deserve.

Cultural barriers such as religious beliefs and social norms may influence robotic telestroke. Saudi society might be sensitive to such technology particularly women. However, our study, for the first time, showed that such technology is highly acceptable among Saudi patients. The vast majority of patients, their relatives, and healthcare providers strongly agreed on the usefulness of the robotic telestroke with high levels of satisfaction. Further, most participants demonstrated no embarrassment or discomfort during the interview and they strongly recommended such technology in Saudi Arabia. Although studies on cultural acceptance of robotic telestroke are lacking, a survey of users of robotic telemedicine in acute care units in 63 healthcare institutions and groups in North America and Europe showed that cultural issues did not constitute meaningful hurdles.[13] In New Zealand, participants saw many benefits and applications for healthcare robots but had some concerns regarding reliability, safety, and the loss of personal care.[14] The same technology was tested in rural Canada, and it involved direct patients assessment and monitoring for various medical conditions where patients and their caregivers, nurses and physicians all expressed a high level of satisfaction.[15]

This study is the first in the region to address this issue. However, several limitations exist. First, the sample size is small and limited to one institution; however, the surveyed population were all patients exposed to telestroke management during the study period in this major healthcare institute in Saudi Arabia. Second, the data collection tool was not formally tested for criterion validity and reliability. Third, the high level of satisfaction might be related to the study subjects' excitement with the idea of communicating with a robot, which might be temporary, rather than an indication of the level of their satisfaction of their actual experience of receiving medical care through telestroke technology. Despite these obvious methodological limitations, this study provides preliminary information on the population acceptance of using new technology in healthcare.

In conclusion, the need for using cutting-edge technology in healthcare is greatly expanding. In stroke, time to intervene is crucial to reduce the mortality and permanent disability. Using the robotic telestroke to provide rapid and timely care might be feasible and culturally acceptable in Saudi Arabia. Future studies are needed in order to generalize the results and to cover and control for unobserved potential variability in the Saudi population.

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