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## Volume 12, Issue 3 / 2010 - Matrix

### Telepresence Using Robots in Acute Care Facilities

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The idea to be in two or more places at the same time is now feasible thanks to technology and telecommunications, which allow physicians to participate in the care of patients that are located at distant suburban communities. In the past, some patients received less than optimal treatment due to geographical remoteness, often relying on care by physicians lacking certain expertise. However, in current times, suburban hospitals can have a well-designed and well-equipped ICU supported by online physicians located in a high-care hospital.

#### The Programme

Telepresence is primarily based on the combination of robotics and telecommunications, which allows interaction between audio/ video connections in real-time between two or more health teams geographically distant from each other. In our programme, acute care facilities include: Intensive Care Unit (ICU), Emergency Room (ER), Operation Room (OR), and (in the wards) the Rapid- Response team. The main objective of Telepresence is to provide a high level of care to critically ill patients in places where a specialised intensivist is not available 24/7.

Our remote presence robotic system works with a control station (Photo 1) connected to a robot RP-7i® (Intouch Health, Santa Barbara, CA, US) by way of a wireless secured Internet connection. The capabilities of the RP-7i® allow it to roam by remote control around the ICU or any other place in the hospital, as long as a Wi-Fi network is present. Personal communication between a 'distant' physician and a patient, other physicians, nurses, or the patient's relatives is possible thanks to a twoway audio/video communication projected on a wide, flat display placed at the robot's 'head'. In this way the patient, physicians, nurses, or any other member of the healthcare team can see and talk to the 'distant' physician without leaving his or her actual location.

Telepresence allows the distance and time for diagnosis to be shortened considerably, further allowing the start of specialised medical attention for a critically ill patient, and additionally supports the nursing team and other medical fellows. In addition, it is possible to acquire medical reports, nurse's reports and laboratory results, as well as to supervise ventilator settings and give advice regarding guidelines, all of which may result in increased quality and safety during medical care at the ICU.

#### Experience of Telepresence with RP-7i® Robots in Mexico

Our institute is leading and coordinating the experience of Telepresence in Mexico by using robots in acute-care facilities. The programme was launched in August 2009 at five suburban hospitals of 60 beds each, covering a population of about one million, either without social security or with 'Seguro Popular'. The programme is intended to compensate for the lack of intensivists in towns/cities that are distant from the main city, and to guide and provide expert support to those physicians who do not have specialised expertise. The Telepresence programme uses an RP-7i® robot to support nine main processes in each hospital:

1. Rounds at acute-care facilities;
2. Care for pregnant women at high risk of death;
3. Advanced trauma life support;
4. Advanced cardiac life support;
5. Neurovascular disease;
6. Rapid response team;
7. Children with severe burns;
8. Coordination for air transportation; and
9. Influenza AH1N1.

As an additional benefit our programme has created a network of acute-care facilities, which are connected to our two most important high-care hospitals (a specialty university hospital, and a maternal/perinatal university hospital), and to a paediatric ICU specialised in severe burns. In the future, we believe there will be an opportunity to coordinate and work with an international network of Telepresence, which means the availability of a virtual critical care medicine practice without borders.

The nerve centre of our programme is located in our hospital (maternal/perinatal university hospital) located in the state-capital, Toluca, Mexico. Five suburban hospitals are involved in the programme (Toluca, Atlacomulco, Valle de Bravo, Tenancingo and Tejuipilco). The closest is the Atlacomulco suburban hospital (located 60 km north of the statecapital) and Tejuipilco is the most distant hospital (located 180 km from the state-capital). In Toluca, we recently allocated an RP-7i® robot to a paediatric ICU which specialises in treating children with severe burns.

From August to December 2009, 165 interventions took place using the RP-7i® robot, the processes involved can be seen in Table 1. Three patients were transferred by helicopter due to severe brain injury and all survived hospitalisation. Generally, there was optimal internet broadband connection thus providing good video images and clear audio sounds. Malfunctions were mainly due to Internet network failure at the suburban hospitals. Medical staff, patients and their relatives easily accepted the programme and were highly convinced about the expertise offered. The programme has technical support from the FONDICT at the UAEMex (State of Mexico Autonomous University).

Additionally, the programme has potential for improvement in other areas, for example: network for access to web-based information (e.g. medical records, X-ray images, to monitor information and advice on ventilator settings, etc.), and Multi-Presence (Intouch Health®) education and teaching for nurses, physicians and medical fellows about critical care topics.

## Conclusion

Technology and telecommunications applied in the ICU has created a new paradigm for critical care practice: This 'new' practice is known as Telepresence. Telepresence can be applied to solve one of the major problems in the ICU, i.e. the lack of intensivists. Critically ill patients in towns/cities that are geographically distant from high-care hospitals will be able to receive specialised medical assistance and attention, thus increasing the quality and safety of care during hospitalisation in the ICU.

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Table 1. Telepresence using RP-7i® robots in Mexico

Published on : Wed, 3 Nov 2010