Using a Humanoid Robot to Improve the Compliance with Hand Hygiene

Bráulio RGM Couto, PhD1,2,3, André LS Alvim, MSc2, Bruna S Mendes, Nurse Student1, Isadora F Oliveira, Nurse Student1, Mário Marcos B Horta, MSc1, Joaquim José Cunha Júnior, PhD1, Maria da Glória S. Nogueira, Nurse2, Carla CGF Viana, Nurse1, Maria Luiza B. Peixoto, MSc2, and Carlos EF Starling, MD2

(1) Centro Universitário de Belo Horizonte - UniBH, Belo Horizonte, Brazil. (2) Hospital Lifecenter, Belo Horizonte, Brazil. (3) Biocor Instituto, Belo Horizonte, Brazil.

Background

- In a similar way that the Aedes aegypt mosquito is a vector for diseases as dengue fever, and zika, healthcare workers can be vectors for hospital infections! How can this happen? By their hands, when they do not wash them properly!
- Despite the fact that handwashing is the single most effective measure to prevent the transmission of disease, make handwashing a habit among healthcare workers remains a major challenge.
- The objective of our study is to answer two questions:
  1. How to adapt a robot as MeccaNoid G15KS to be an instrument of health training and continuous education of healthcare workers?
  2. What is the effectiveness of the use of a humanoid robot on the compliance with hand hygiene?

Methods

- Until recently, advanced humanoid robots were found in limited numbers due to high prices. MeccaNoid G15KS, a humanoid robot 122 cm tall, it was released as a toy in the beginning of 2015. Nowadays it can be purchased for less than US$ 200.
- It is a programmable robot mainly designed to interact with children. It became “he” when MeccaNoid was baptized Ozires, in honor of the Brazilian engineer Ozires Silva, from Embraer.
- The robot was adapted with mini projector, an automatic alcohol hand sanitizer dispenser, and an audio amplifier. The mini projector allows video lessons even in small rooms.
- Ozires, accompanied by infection control practitioners, performs short video-lecture presentations and own reports of the institution's data regarding infections and the hand hygiene rate, working from 10 to 15 minutes in each target sector.
- Ozires was engaged as a hand hygiene improvement strategy in two hospitals from Belo Horizonte, Brazil: Hospital A (pilot study: Jan-Nov/2016) and Hospital B (Jul/2017-Aug/2018).
- Measuring hand hygiene adherence: we conducted systematic hidden surveys when "the actions were compared with the opportunities for hand hygiene." The result was the rate of hand hygiene compliance: Total number of use of hand hygiene when the opportunity existed

Results

- **Hospital A** (pilot study): after the insertion of Ozires in three ICUs, hand hygiene rate increased from about 30%, between January and July, to 65% in August-November/2016. In all months of 2017, consumption of alcohol preparation remained above 20 ml/patient-day, the minimum expected consumption recommended by the World Health Organization.
- **Hospital B**: Ozires started his lectures in May, 2018, in the whole hospital. Hand hygiene adherence increased from about 23%, between July and December/2017, to 58% in June-August/2018.

Conclusions

- We succeeded in adapting a toy robot as instrument of continuous education of healthcare workers, creating a new education tool, a robot tutor. Hand hygiene compliance raised significantly after the intervention in both hospitals. With the continuing education approach based on Ozires, it is not necessary to take healthcare workers out from their work area, which can be a novel education strategy, more interactive, that can really personalize health education.