

in combat fields and operate in tough terrain with minimal guidance from remote human operators.<sup>4</sup> SAFFiR,<sup>5</sup> a humanoid robot that functions as a firefighter, can operate fire-suppressing equipment, see through smoke, and navigate passageways, ladders, and hatches of a ship even when the ocean is rough. The remote control and communication capability of rescue robots ensure the safety of human operators and open the possibility of crowdsourcing—an effort employed in the search for Malaysia Airlines Flight 370.

Existing robot technology is promising for disaster relief. Collaboration between researchers and the industry could bridge the gap between the theoretical and practical side of rescue robot technology, lending to designs optimized for manufacturing and cost-effectiveness. Robotic responders with the required qualities to operate in disaster environments will provide invaluable assistance to rescue efforts.

### About the Authors

Medical Robotics Laboratory, College of Engineering, The University of Georgia, Athens, Georgia (Dr Tse, Ms Hovet); Department of Psychology, Emory University, Atlanta, Georgia (Ms Cheung); Department of Epidemiology, Jiann-Ping Hsu College of Public Health, Georgia Southern University, Statesboro, Georgia (Dr Fung).

Correspondence and reprint requests to Isaac Chun-Hai Fung, PhD, Department of Epidemiology, Jiann-Ping Hsu College of Public Health, Georgia Southern University, Statesboro, Georgia 30460-8015 (e-mail: cfung@georgiasouthern.edu).

Published online: March 28, 2016.

doi:10.1017/dmp.2016.91

## Enough With Polio: It's Measles' Turn Now in Pakistan

Inayat Ur Rehman, PharmD, MSc; Tahir Mehmood Khan, BPharm, MSc, PhD

**V**iruses still present a chief threat to mankind. Polio is a virus-borne disease that remains a major challenge in Pakistan. However, it is a misfortune that all of the resources of the extensive program on immunization in Pakistan are specified toward eradication of polio only. This specification neglects or gives little priority to other vaccine-preventable diseases that are equally disastrous in the event of an outbreak, especially measles, which claimed many lives in Pakistan in 2012 and 2013. Measles weakens the immune system, particularly in youngsters, making them susceptible to pneumonia and encephalitis, which can lead to death.<sup>1</sup>

Measles is to date a leading cause of death among young children in Pakistan and around the globe. Despite the implementation of global and national guidelines in 2011,

### Acknowledgment

ICHF receives salary support from the Centers for Disease Control and Prevention (15IPA1509134). This letter is not related to ICHF's CDC-supported research.

### Disclaimer

The CDC had no role in the writing, submission, or publication of this letter. This letter does not represent the official positions of the CDC or the US Government.

### REFERENCES

1. Associated Press in Beijing. Tianjin explosion: China sets final death toll at 173, ending search for survivors. *The Guardian* (London). <http://www.theguardian.com/world/2015/sep/12/tianjin-explosion-china-sets-final-death-toll-at-173-ending-search-for-survivors>. Published September 12, 2015. Accessed February 10, 2016.
2. Boyette C. Robots, drones and heart-detectors: how disaster technology is saving lives. CNN website. <http://www.cnn.com/2015/08/24/us/robot-disaster-technology/>. Published October 5, 2015. Accessed August 25, 2015.
3. Rosen M. Robots to the rescue: DARPA's robotics challenge inspires new disaster-relief technology. *Science News*. 2014;186(12):16-20.
4. Feng S, Xinjilefu X, Atkeson C, Kim J. Optimization based controller design and implementation for the Atlas robot in the DARPA Robotics Challenge Finals. Preprint submitted to 2015 IEEE-RAS International Conference on Humanoid Robots, July 7, 2015. Carnegie Mellon University, School of Computer Science website. [http://www.cs.cmu.edu/~cga/drc/ICHR15\\_0025\\_MS.pdf](http://www.cs.cmu.edu/~cga/drc/ICHR15_0025_MS.pdf). Accessed September 5, 2015.
5. Kim JH, Lattimer BY. Real-time probabilistic classification of fire and smoke using thermal imagery for intelligent firefighting robot. *Fire Safety Journal*. 2015;72:40-49.

Pakistan was among the 5 nations where about 1 million children were not vaccinated with the first dose of measles<sup>2</sup> vaccine owing to low measles vaccination coverage. This resulted in a measles outbreak with 4380 cases confirmed which claimed 64 precious lives.<sup>3</sup> In Pakistan from January 2012 to May 2013, only 8.0% of children received the recommended initial and booster doses of the measles vaccine. The majority of unvaccinated youngsters assessed by humanitarian partners later on developed post-measles complications, with confirmed cases of measles (n = 25,859) and deaths (n = 570). The incidence of measles cases and deaths reported was much higher in 2013 than in previous years.<sup>4</sup>

The 2014 statistics for measles in Pakistan revealed that vaccination coverage was 63.0%, suspected measles cases numbered 2555, whereas cases confirmed by laboratory tests

numbered 1362.<sup>5</sup> Overall in Pakistan in 2014, according to the World Health Organization (WHO), there were about 25 outbreaks of measles in Punjab, whereas in 2013 there were about 33 outbreaks in Baluchistan, formerly known as a vaccination-resistant region of Pakistan. In early 2014, Sindh province appeared as a hotspot for measles with an estimate of 1211 cases, followed by 483 in Baluchistan and an estimated 290 in Khyber Pukhtoonkhwa.

### RECOMMENDATIONS AND FUTURE IMPLICATIONS

Thus far, there has been a lack of any corrective measure to minimize the chances of future measles outbreaks. Pakistan is part of the Global Measles & Rubella Strategic Plan 2012-2020; hence, it is imperative that the plan be implemented. The Global Measles & Rubella Strategic Plan 2012-2020 was developed between the WHO and partners in the Measles and Rubella Initiative. For achievement of this objective, a few core steps to be implemented are enhancement in vaccination coverage for the initial and booster dose of measles and against rubella, effective surveillance, outbreak preparedness and immediate response, community engagement by confidence building for vaccination, and research and development.

If measles is to be eradicated from Pakistan, the multifactorial causes of the measles epidemic must be understood and a multidimensional approach should be adapted to manage these. The answer lies in combined improvement of vaccination services to the public, improving parents' knowledge and

awareness, motivating physicians to become advocates for the immunization programs, and involving all influential personnel and key stakeholders. In addition, a highly efficient surveillance mechanism should be set up so more information on the population affected by measles can be obtained. With this multi-pronged approach, it is hoped that the senseless and preventable deaths of our young will soon be a relic of the past.

### About the Authors

*School of Pharmacy, Monash University, Selangor, Malaysia.*

*Correspondence and reprint requests to Dr Tahir Mehmood Khan (BPharm, MSc, PhD), School of Pharmacy, Monash University, Malaysia, Bandar Sunway 45700, Selangor Malaysia (e-mail: tahir.mehmood@monash.edu).*

**Published online:** June 6, 2016.

### REFERENCES

1. Thompson AE. Recognizing measles. *JAMA*. 2015;313(15):1584.
2. WHO. Measles & rubella initiative. Annual report 2012. [http://www.who.int/immunization/diseases/MRI\\_2012\\_Annual\\_Report.pdf](http://www.who.int/immunization/diseases/MRI_2012_Annual_Report.pdf). Published 2013. Accessed May 10, 2016.
3. Is Pakistan losing the battle against measles? IRIN humanitarian news and analysis. <http://www.irinnews.org/report/100088/pakistan-losing-battle-against-measles>. Published May 15 2014. Accessed May 10, 2016.
4. Pakistan: Measles Outbreak - May 2012 - Dec 2013. Relief Web website. <http://reliefweb.int/disaster/ep-2012-000211-pak>. Accessed December 29, 2015.
5. WHO. Reported measles cases and incidence rates by WHO Member States 2013, 2014 as of 11 February 2015. [http://www.who.int/immunization/monitoring\\_surveillance/burden/vpd/surveillance\\_type/active/measles-reportedcasesbycountry.pdf](http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/active/measles-reportedcasesbycountry.pdf). Accessed May 10, 2016.