tion, cleaning or replacement of equipment between use on different patients, and regular oral care.

According to the authors, "16.44 patients will develop VAP for every 1,000 ventilation days without using VAP bundles as compared with 9.43 patients developing VAP for every 1,000 ventilation days using VAP bundle protocol." This showed that using VAP bundle among patients supported with ventilators would significantly decrease (p=0.0008) the occurrence of VAP.

The study involved patients admitted in the intensive care units of Makati Medical Center for the period of January 2009 to December 2012. Number of VAP cases were determined between intubated patients, for the period of 2009 to 2010, to whom VAP bundle was not administered and patients, for the period of 2011 to 2012, who were under VAP bundle. At 5 percent alpha level of significance, the incidence rate ratio of VAP between the two groups was determined.

"Poor compliance to VAP bundle does not give any significant results," the authors claimed, citing other studies. Hence, strong execution of the protocol is essential in ensuring the effectiveness of the VAP bundle. The authors also mentioned that there is a 58 percent decrease in VAP rates when a case progresses from not observing the protocol to full implementation.

Preventive disaster medicine feature

Drop, cover and hold vs the triangle of life: Which is the best thing to do during an earthquake?

DR LIGAYA SOLERA

Although earthquakes cannot be predicted, studies have shown that the Valley Fault System, one of numerous earthquake generators transecting or surrounding Metro Manila, is approaching active phase.[1] The West Valley Fault generates strong earthquakes every 400-600 years, and the last was in 1658, so it is

Recent earthquake in Nepal.

likely to cause another major earthquake "within our lifetime," according to Philippine Institute of Volcanology and Seismology (PHIVOLCS) Director Renato Solidum Jr.[2] Thus, the Philippine government is conducting earthquake drills and information campaigns to prepare its citizens.

Is the "triangle of life" advisable?

The "triangle of life" theory – which is mostly circulated online through emails and social media sites and was mentioned in the recent disaster film *San Andreas* – advises people to seek shelter next to solid objects that are unlikely to be crushed if the building collapses, such as a large steel safe, a sofa or a refrigerator.[3] The problem with this advice, said Solidum, is that nearly everything moves during an earthquake. "The refrigerator is usually high, hence it can topple down. It may even kill or injure you if you lie beside it," Solidum pointed out.[4]

Disaster experts Rocky Lopes and Marla Petal agree with Solidum.[5-6] They confirmed that, when buildings collapse, there are "triangles of life" or "life-safe voids" that form next to large, strong, heavy objects. However, it is difficult for ordinary people to anticipate where these triangles will form. "Identifying potential 'void areas' and planning on using them for earthquake protection is more difficult to teach, and hard to remember for people who are not educated in earthquake engineering principles," said Lopes.

Like Solidum, Lopes and Petal believe that the conventional earthquake response to "drop (or duck), cover and hold on" (DCH) is still a good rule of thumb for most people to follow.

"Triangle of life" vs DCH

Engineering geologist Mohammad Reza Mahdavifar and colleagues from the International Institute of Earthquake Engineering and Seismology conducted a study[7] on the applicability of the "triangle of life" versus DCH. In their comparative analysis, the researchers considered such factors as the intensity of the earthquake, the construction materials used in the building, and the teachability of each survival concept.

Mahdavifar et al noted that:

• In earthquakes with an intensity of less than VII, there is a greater possibility of injury from non-structural elements – such as falling debris, flying objects, broken glass, and people pushing each other – than of building collapse.

• The "triangle of life" may be appropriate for people in buildings with concrete or steel skeletons during intensity VII or greater earthquakes.

• In structures made of brick or mud without steel/concrete skeletons, "triangles of life" are not likely to form.

• While sheltering next to a heavy object seems simple, people cannot reliably identify

which objects will not be crushed or toppled and on which side of these objects the "triangle of life" will form.

• By their calculations, the people likely to benefit from DCH are 12,000 times those for whom the "triangle of life" is appropriate.

"Additionally, it is also difficult to recommend two sets of 'sheltering' guidelines to people," the researchers wrote. "As a result, the 'DCH' advice can then be proposed as a more useful instruction that one can follow to protect himself/herself during earthquakes."

Drop, cover, hold

In earthquake-prone countries such as Japan, the US and New Zealand, citizens are trained to "drop, cover and hold on" in the event of an earthquake.[8-12]

• Dropping to hands and knees prevents people from falling down but still allows them to move if necessary.

• Taking cover under a sturdy desk or table protects people from falling debris. If there is no table nearby, an alternative is to take shelter next to low-lying furniture or an interior wall.

• Holding on to the table or other sturdy shelter allows people to move with it until the shaking stops.

Dr Ted Esguerra, an operational medicine and disaster response specialist in the Philippines, reminded people not only to drop, cover and hold, but also to keep their eyes open. "Use your eyes to scout the surroundings, and hands for stabilizing and anchoring and sensing." If you do that, Esguerra said, "your margin to survive increases."

Resources: 1. Japan International Cooperation Agency (JICA), Metropolitan Manila Development Authority (MMDA), Philippine Institute of Volcanology and Seismology (PHIVOLCS). Metro Manila Earthquake Impact Reduction Study. Available at http://www.phivolcs.dost.gov.ph/index.php?option=com_content&view=article&id=419%3Ammeirs&catid=66&Itemid=122. Accessed 10 July 2015. 2. Ranada P. High resolution West Valley Fault maps launched. Rappler. Updated 19 May 2015. Available at http://www.rappler.com/move-ph/issues/disasters/93575-valley-fault-system-map-launch. Accessed 10 July 2015. 3. Copp D. American Rescue Team Survival Magazine Article. American Rescue Team International. Available at http://www.amerrescue.org/arti_survivalarticle.htm. Accessed 10 July 2015. 4. De Leon A. DOST-PHIVOLCS chief belies "Triangle of Life" earthquake safety theory. Department of Science and Technology - Science and Technology Information Institute. 10 December 2013. Available at http://www.stii.dost.gov.ph/index.php?option=com_content&view=article&id=253%3Aby-angelica-a-de-leon-sat-media-service-dost-stii&Itemid=56. Accessed 10 July 2015. 5. Lopes R. Response to "Triangle of Life" by Doug Copp. 24 August 2004. Available at http://www.bpaonline.org/Emergency-prep/arc-on-doug-copp.html. Accessed 10 July 2015. 6. Petal M. The Need for an Evidence-Basis for Earthquake Survival Tips. September 2006. Available at http://www.earthquakecountry.info/dropcoverholdon/Petal_Rejoinder_to_Copp_0906.pdf. Accessed 10 July 2015. 7. Mahdavifar MR, Izadkhah YO, Heshmati V. Appropriate and correct reactions during earthquakes: "Drop, cover and hold on" or "triangle of life". *Seismology Earthquake Eng*. 2009 Spring;11(1):41-48. Available at http://www.sid.ir/en/VEWSSID/J_pdf/86020090104.pdf. Accessed 10 July 2015. 8. Earthquake Early Warning System. Japan Meteorological Agency (JMA). Available at http://www.jma.go.jp/jma/en/Activities/eew.html. Accessed 10 July 2015. 9. Earthquake disaster countermeasure. Tokyo Metropolitan Government. Disaster Prevention Website. Available at http://www.bousai.metro.tokyo.jp/foreign/english/bousai/2000013/2000092.html. Accessed 10 July 2015. 10. Earthquakes. Ready. Federal Emergency Management Agency. Available at http://www.ready.gov/earthquakes. Accessed 10 July 2015. 11. Earthquakes. Emergency Preparedness and Response. Centers for Disease Control and Prevention. Available at http://emergency.cdc.gov/disasters/earthquakes/. Accessed 10 July 2015. 12. Earthquake! Get Ready Get Thru. New Zealand Government. Available at http://www.getthru.govt.nz/disasters/earthquake/. Accessed 10 July 2015.