Pediatric drowning and submersion injuries in Singapore: A five-year retrospective study

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Introduction
Drowning is amongst the leading causes of accidental death in young children. As emergency care providers, we recognize the importance of prevention strategies minimizing the morbidity and mortality associated with submersion injuries.

Objectives
Description of local epidemiology of drowning and submersion injuries, and identification of possible risk factors. From this, we would be able to raise awareness and recommend preventive strategies to the local community.

Methods
We retrospectively identified all drowning and submersion related Children Emergency attendances from November 2005 to January 2010. The variables analyzed were age, gender, race, co-morbidities, location of submersion, duration of submersion, presence of adult supervision, person who initiated cardio-pulmonary resuscitation (CPR), duration of hospitalization, and highest level of care. Data was analyzed using SPSS version 14.

Results
There were 49 cases of drowning and submersion injuries over this five year period, with a median age of four years eight months and a male:female ratio of 1.2:1. The ethnic distribution was: Chinese 51%, Malay 26.5%, Indian 6.1% and others 16.3%. Four cases had significant pre-morbid conditions: cyanotic heart disease (1), moderate ventricular septal defect (1), Rubenstein-Taybi syndrome with global developmental delay (1), autism (1).

Majority (57.1%) submerged while swimming. 34.7% occurred as accidental falls, and the remaining 8.2% occurred in the bathtub, watercraft / sports-related accidents and suicide / para-suicide. Thirty-one cases (63.3%) occurred in swimming pools. Of note, 77.0% of these cases occurred in private rather than public pools. As for the rest of the cases, seven were located at home and five in the sea. Only 24.5% had a supervising adult who witnessed the submersion. The remaining either had been unsupervised (30.6%), or supervised but submersion un-witnessed (42.9%). CPR was performed in 26 cases – 69.2% – administered by non-medical personnel and 30.8% administered by lifeguard or medical personnel.

Forty-six of the 49 cases required hospitalization, with seven (15.2%) admitted to intensive care (ICU) and 10 (21.7%) to high dependency (HD). Poor adult supervision was associated with a higher level of care (HD and ICU) (OR 3.4, relative risk 1.28 95% CI 1-1.7). The mean duration of hospital stay was 2.4 days (range 1–12 days) and there were two deaths in our study population.

Discussion
Significant morbidity and mortality is associated with drowning and submersion injuries. In our study population, most cases had nil or poor adult supervision and this in turn seemed to be associated with increased morbidity as demonstrated by higher levels of inpatient care. More submersions were located in private pools. In our local community, private pools are found in homes, condominiums, cluster housing and recreational clubs, often with no lifeguards present. When CPR was done, it was often performed by non-medical personnel.

Conclusion
It is vital to raise awareness of submersion injuries in our community. This study highlights the need for proper adult supervision, and we recommend that management of private pools consider placing lifeguards on duty. Often, the public is the first-line in submersion injuries, thus community education of CPR is important.

References

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