Near-Drowning in Pediatric Respiratory Intensive Care Unit, Siriraj Hospital

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Objectives: *To study characteristics, treatment and outcome of near-drowning patients in Pediatric Respiratory Care Unit (P-RCU), Siriraj Hospital*
Material and Method: *We retrospectively reviewed hospital records of 31 near-drowning patients admitted at P-RCU Siriraj Hospital during 1990-2002.*
Results: *The average age of admitted patients was 4 years (ranged from 6 months to 13 years). Seventy percent of the patients were under 5 years of age. Male: female ratio was 2.1:1. Sixty-two percents of the patients were left alone when near-drowning occurred. The sites of occurrence were around their houses in 60% of cases. Bystander resuscitation was documented in 35%. Common complications were pneumonia (74.2%) and seizure (58%). Patients with poor outcome were children without spontaneous purposeful movement within 24 hours after submersion. Neurological sequelae was found in 35.5% of the cases and the mortality rate was 25.8% (3 due to severe pneumonia from prolonged intubation and aspiration, 2 due to severe brain hypoxia, 2 due to severe adult respiratory distress syndrome (ARDS) and 1 due to intracerebral hemorrhage)*
Conclusion: *Due to poor outcome observed in this study, prevention of submersion injury is the most important and cost-effective measure. However, if near-drowning happens, effective immediate resuscitation is crucial for the best outcome.*

Keywords: *Near-drowning children, RCU, Cardiopulmonary resuscitation*

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Near-drowning is common in children and has a high mortality rate[1]. Some survivors remain in a vegetative state after the accident and are a great burden to their family and society. Drowning remains the second-leading cause of injury-related death for children ages 1 to 14 years[2]. The overall incidence of childhood drowning in some country appears to be decreasing and most of the risk groups for drowning are still children aged between 0-4 years [3,4].

This study was designed to retrospectively study characteristics, treatment and outcome of near-drowning patients in Pediatric Respiratory Care Unit (P-RCU), Siriraj Hospital.

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Material and Method

We retrospectively reviewed 31 charts of patients brought to Pediatric Respiratory Care Unit, Siriraj Hospital due to near-drowning or drowning during 1990-2002. Historical data recorded were age, sex, admission and discharge dates, estimated submersion interval, whether drowning was witnessed, bystander performance of cardiopulmonary resuscitation (CPR), the treatment, complication and outcome of treatment.

Results

A total of 31 cases of near-drowning children were reviewed. The youngest was 6 months old and the oldest was 13 years old. Twenty cases (64.5%) were children aged between 1-4 years old and male to female ratio was 2.1:1. Nineteen of them were alone when the events took place. Six cases occurred when

Table 1. Time of submersion interval, neurological sequelae and fatal victims

Time of submersion interval (minutes) C	Cases	Neurological sequelae	Death	%
0 - 5	55	0	1	20
6 - 10	112	6	4	33.3
> 10	22	2	0	0
Unknown	112	3	3	25

the children were playing or swimming while 4 cases were accidental falling into the water. No existing disease that might be the causal importance was identified. All were fresh water near-drowning victims. Twenty-one of them (67.7%) took place around their houses such as in the canal and in the fish pond. Five cases occurred in the swimming pool; four in their own home such as in bath tubs and one in the Chao Phraya river.

Most of our victims could not be estimated submersion. Time of submersion interval, neurological sequelae and fatal victims were shown in Table 1.

Eleven cases were resuscitated by mouth to mouth and cardiac massage. Thirteen were held over the shoulder. Four cases had no resuscitation record. Twenty cases were referred from other hospitals because they required the ventilator support and had financial problem. Twenty-eight cases needed ventilator support for 1 to 59 days (average 10.5 days). Antibiotics were given in 30 victims. Nineteen cases presented with comatose condition but only 2 had completely recovered. All fatal victims had been coma when they presented except one case who died from severe pneumonia who arrived with alert conscious. Common complications were pneumonia (74%), seizure(62%), and neurological sequelae (35.5%). Other complications were upper gastrointestinal hemorrhage, sepsis, acute pulmonary edema, urinary tract infection, acute respiratory distress syndrome, acute hepatic injury, acute pancreatitis, pneumothorax, pneumomediastinum, pulmonary hemorrhage, intracerebral hemorrhage and multiorgan failure.

Seventy percents of the victims who recovered within 24 hours survived. Among 10 patients who did not recover within 24 hours, 6 died and 4 had neurological sequelae. Eight of them (25.8%) who died were treated in the intensive care unit for 7-59 days (average 22 days). For the causes of death, 3 due to severe pneumonia, 2 due to severe brain hypoxia, 2 due to severe ARDS and 1 due to intracerebral hemorrhage.

Discussion

Near drowning is a common accident[3,4]. Risk groups for drowning include children aged 0-5 years. Our study showed that 70% was children less than 5 years of age. Children can drown in just a couple inches of water and can drown in seconds. Drowning can happen anytime if a child is left alone around water. It can happen in a bathtub or sink, in a bucket or toilet, in a pool, hot tub, lake or in the river.

Effective immediate resuscitation is crucial for the best outcome[5]. Cardiopulmonary resuscitation (CPR) is the mainstay of immediate management[5,6]. If the victim is not breathing, start mouth-to-mouth resuscitation should be initiated immediately. If the victim doesnot have a pulse, CPR (cardio-pulmonary resuscitation) should be performed. If the water was cold, the victim's body will need to be warmed up. Bystander resuscitation was documented in only 35% of our patients, which is the reason of poor outcome (death or neurological sequelae) in our study. The resuscitation training program should be considered for the public. Basic life support is essential for the lifeguard. They should have a bag mask device and know well enough to hold the mask properly to ventilate the victims.

All near-drowning patients should be sent to the hospital, even if they started breathing[7]. All near drowning victims should receive vigorous and aggressive treatment in the early course of illness and need close monitoring for respiratory complications and neurological signs[8]. From the present study, discrimination analyses include Glasgow coma scale, time of submersion interval, blood glucose level or Prism score, can not accurately separate all intact survivors from the vegetative groups[1,9,10]. Attempt should be made to restore breathing and pulse, even if the person looks like they cannot be saved. Our study showed that groups of patients with poor outcome were children without spontaneous purposeful movement within 24 hours after submersion, while among victims who recovered within 24 hours, 71.4% of them survived.

Due to poor outcome of the treatment and most cases is occurred around their houses, drowning prevention should be a significant public health issue. Parents should never leave the children unsupervised around water, including in a bath, pool, kiddy pool, or even near toilets or buckets. Bathtubs are particularly dangerous for infants as the slippery and smooth surfaces predispose to loss of balance and make escape from water difficult[11].

The education and support of rescue services and public awareness campaigns is also important. They should be directed towards the need for effective pool fencing, parental supervision of young children, cardiopulmonary resuscitation skills, and will include other measures that can assist in preventing drowning in young children. A system to evaluate drowning, prevention interventions should be developed to further investigate risk factors for childhood drowning.

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ผู้ป่วยเด็กจมน้ำในหออภิบาลอาร์ซียู โรงพยาบาลศิริราช

จักรพันธ์ สุศิวะ, ฐิติมา บุญรงค์

วัตถุประสงค์: *เพื่อศึกษาข้อมูลและผลการรักษาผู้ป่วยเด็กจมน้ำที่เข้ารับการรักษาในหออภิบาล อาร์ซียู ภาควิชากุมารเวชศาสตร์ คณะแพทยศาสตร์ศิริราชพยาบาล*

วัสดุและวิธีการ: *เป็นการศึกษาย้อนหลัง โดยรวบรวมข้อมูลจากเวชระเบียนของผู้ป่วยเด็กจมน้ำที่เข้ารับการรักษาในหออภิบาล RCU ภาควิชากุมารเวชศาสตร์ คณะแพทยศาสตร์ศิริราชพยาบาล ตั้งแต่วันที่ 1 เมษายน พ.ศ.2533 ถึง วันที่ 31 ธันวาคม พ.ศ.2545*

ผลการศึกษา: *มีผู้ป่วยทั้งหมด 31 ราย อายุเฉลี่ย 4 ปี (ตั้งแต่ 6 เดือน ถึง 13 ปี) อัตราส่วนเพศชายต่อเพศหญิงเป็น 2.1 : 1 โดยร้อยละ 62 เกิดเหตุขณะทิ้งให้เด็กอยู่ตามลำพัง ทั้งหมดจมน้ำจืดและเป็นแหล่งน้ำบริเวณใกล้บ้านหรือในบ้าน ร้อยละ 80 มีผู้ป่วยเพียงร้อยละ 35 ที่ได้รับการช่วยปฐมพยาบาลเบื้องต้นโดยการเป่าปาก และ/หรือการนวดหัวใจ ภาวะแทรกซ้อนที่พบได้บ่อย ได้แก่ ปอดอักเสบติดเชื้อ (ร้อยละ 74.2), ชัก (ร้อยละ 58) และความพิการทางสมองหลงเหลือ (ร้อยละ 35.5) ผู้ป่วยที่มีผลการรักษาไม่ดี คือมีความพิการทางสมองหลงเหลือหรือเสียชีวิต พบมากผู้ป่วยที่ไม่ฟื้นคืนสติภายใน 24 ชั่วโมงหลังจมน้ำ มีผู้เสียชีวิต 8 ราย (ร้อยละ 25.8) โดยผู้ป่วย 3 รายเกิดจากปอดอักเสบติดเชื้อรุนแรงซึ่งเป็นผลจากการใส่ท่อช่วยหายใจเป็นเวลานาน ผู้ป่วย 2 รายเกิดจากปอดอักเสบ ARDS ผู้ป่วย 2 รายเกิดจากสมองขาดออกซิเจนอย่างรุนแรงและผู้ป่วย 1 รายมีเลือดออกในสมอง*

สรุป: *ผู้ป่วยที่มีผลการรักษาไม่ดี คือเสียชีวิตหรือมีความพิการทางสมองหลงเหลือมีจำนวน 19 ราย (ร้อยละ 61.3) ซึ่งเป็นจำนวนที่สูงแม้ว่าจะมีการดูแลในหออภิบาลอย่างเต็มที่ ดังนั้นการป้องกันภาวะจมน้ำน่าจะเป็นวิธีการที่ดีที่สุดและคุ้มค่าที่สุด และเมื่อเกิดเหตุการณ์จมน้ำ การช่วยฟื้นคืนชีพที่รวดเร็วและถูกวิธี จะทำให้มีผลการรักษาที่ดีขึ้น*