

# Non-Fatal Drowning in Australia

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## Part 2: Impact of non-fatal drowning



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We achieve this through advocacy, education, training, health promotion, aquatic risk management, community development, research, sport, leadership and participation, and international networks.

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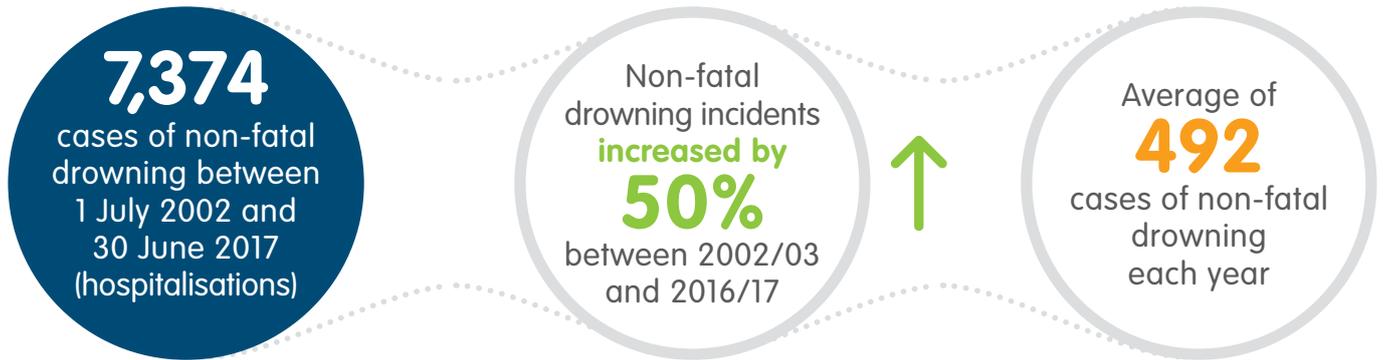
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# NON-FATAL DROWNING IN AUSTRALIA

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## Length of hospital stay



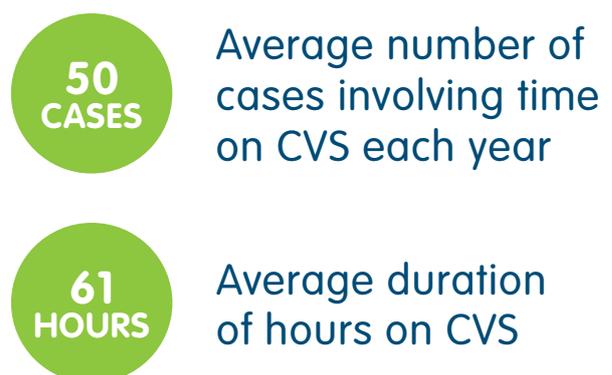
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## Intensive care (ICU)



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## Continuous ventilatory support (CVS)



## BACKGROUND

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Fatal drowning has long been the focus of the drowning prevention community. In Australia, Royal Life Saving Society – Australia (RLSSA) and Surf Life Saving Australia (SLSA) collect, analyse and report on unintentional fatal drowning, including historical trends and factors such as age, sex, location, remoteness classification and activity. However, many more non-fatal drowning incidents occur each year.

The updated definition of drowning incorporates three possible outcomes: death, morbidity and no morbidity, signifying the continuum of possible consequences following a drowning incident (1). It should be noted that 'non-fatal drowning' is the correct terminology and phrases such as 'near-drowning' are inappropriate for use. The Australian Water Safety Strategy (AWSS) 2030 encourages a continued focus on the full burden of drowning, with research and policy activities designed to further our understanding of non-fatal drowning and its impacts (2).

Previous research investigated hospitalisations in Australia, reporting 6,158 cases of non-fatal drowning over a 13-year period (3). Over the course of the study, non-fatal incidents increased by 42% (3). In Australia, for every one fatal drowning, a further three people are admitted to hospital following a non-fatal incident (3). Among children aged 0-4 years, this ratio increases to eight non-fatal incidents (3).

Since the publication of this research, non-fatal drowning statistics have been routinely included in annual reports to raise awareness of the different outcomes of drowning. However, information on incident severity has been lacking. For example, we do not know how long patients stay in hospital following a non-fatal drowning, nor do we know what treatment they receive while admitted.

Building on this previous study, additional data has been obtained to continue monitoring non-fatal drowning over time, as well as investigate the impact of non-fatal drowning. In addition to hospitalisation figures in Australia over a 15-year period, this study examines the mean length of hospital stay, number of patient days, time in an Intensive Care Unit (ICU) and the number of hours of Continuous Ventilatory Support (CVS) received over a 4- or 5-year period.

## METHODS

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The non-fatal drowning data used in this report were made available by the Australian Institute of Health and Welfare (AIHW). The authors are responsible for the use made of the data in this report.

Non-fatal drowning incidents that occurred in Australia between 1 July 2002 and 30 June 2017 were collated using hospitalisation data. Hospital separations (a process by which an episode of care for an admitted patient ceases, for example, due to their discharge from hospital or their transfer to another facility) were used to calculate the number of hospitalisations related to a non-fatal drowning event.

Data were obtained from the Australian Institute of Health and Welfare's (AIHW) National Hospital Morbidity Database (NHMD). Hospital separations where the principal diagnosis was any code in ICD-10-AM Chapter XIX Injury, poisoning and certain other consequences of external causes (S00-T98) and the first reported external cause of morbidity was Accidental Drowning and Submersion (W65-W74) were included. For further information on these classifications, see below.

### **Accidental drowning and submersion includes the following subdivisions:**

- › Drowning and submersion while in bathtub (W65)
- › Drowning and submersion following fall into bathtub (W66)
- › Drowning and submersion while in swimming pool (W67)
- › Drowning and submersion following fall into swimming pool (W68)
- › Drowning and submersion while in natural water (W69)
- › Drowning and submersion following fall into natural water (W70)
- › Other specified drowning and submersion (W73)
- › Unspecified drowning and submersion (W74)

### **These subdivisions were then combined in the following way for the resulting analysis:**

- › W65 and W66 – Bathtub
- › W67 and W68 – Swimming Pool
- › W69 and W70 – Natural Water
- › W73 and W74 – Other or Unspecified location

Data were provided in aggregate format by the AIHW, whereby individual drowning events could not be distinguished. As such, no identifying data or case histories were available.

Hospitalisations related to a drowning incident were excluded for one of two reasons. Firstly, if the patient died in hospital, and secondly, if the patient was transferred from another acute care facility. The mode of separation field was used to exclude patients who died in hospital. This was done to avoid an overlap between fatal and non-fatal drowning cases. The mode of admission field was used to exclude patients who were transferred from another acute care hospital. This was done to avoid double counting drowning cases where the patient was admitted to one hospital but then transferred to another facility, within the same episode of care.

### **Severity measures**

The mean length of stay is the average number of days each patient stays in hospital in acute care. This was calculated by dividing the total number of patient days for a reporting period by the estimated number of cases for the same period.

Patient days are the number of full and partial days a patient spends in hospital. One patient day is counted for same-day patients (admitted and discharged from hospital on the same day).

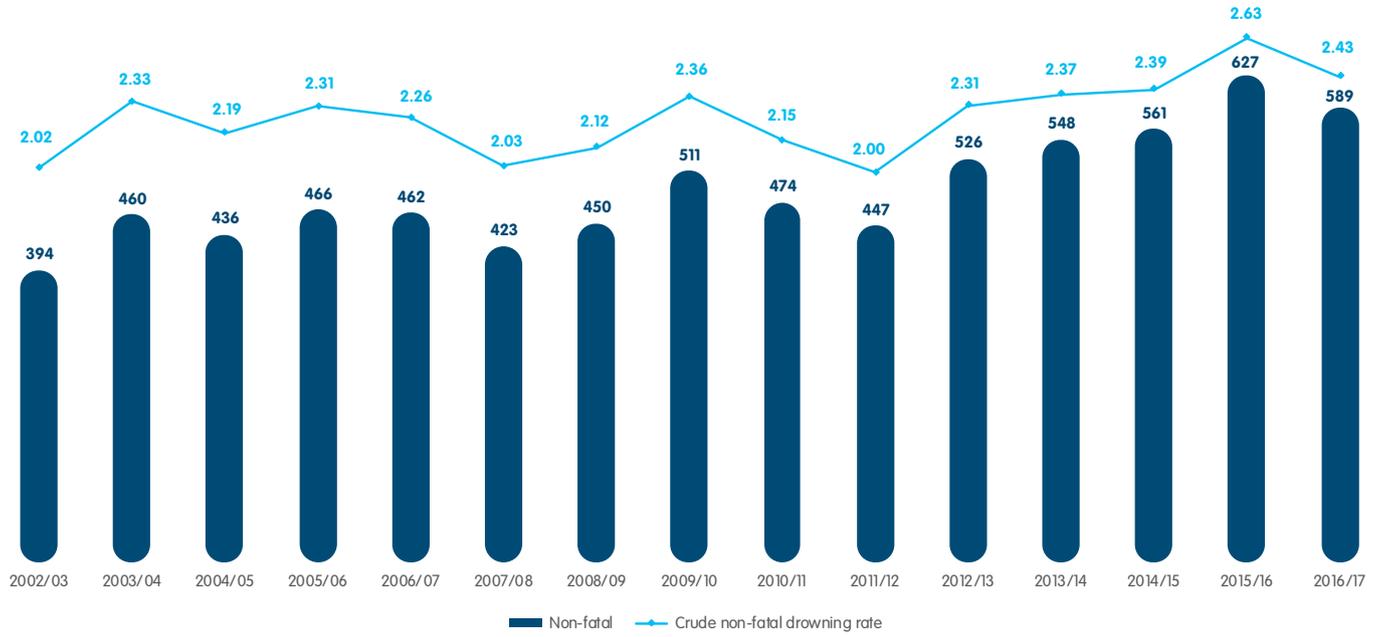
Information is presented on the number of hours that patients stayed in an Intensive Care Unit (ICU) and the number of hours of Continuous Ventilatory Support (CVS) received (not all admitted patients receive CVS in an ICU). It is likely that the numbers reported here are underestimates, as they are based on the initial episode of care and do not include any additional time an individual spent in an ICU. Information on ICU hours was not available for all hospitals (private hospitals in New South Wales, Tasmania, the Australian Capital Territory and the Northern Territory are excluded).

CVS (also known as invasive ventilatory support or mechanical ventilation) refers to the use of a machine to assist breathing. Periods of ventilatory support that are associated with anaesthesia during surgery, and which are considered an integral part of the surgical procedure, are not included. Information on CVS hours was not available for all hospitals (private hospitals in Tasmania, the Australian Capital Territory and the Northern Territory are excluded).

Information on mean length of stay and number of patient days was available for 2012/13 to 2016/17. Information on severity was only available for 2013/14 to 2016/17.

## RESULTS

Between 1 July 2002 and 30 June 2017, there were 7,374 cases of non-fatal drowning in Australia (hospitalisations). This is an average of 492 non-fatal incidents each year. Over the course of the 15-year study, non-fatal incidents have increased by 50%. The crude non-fatal drowning rate reached a high of 2.63/100,000 in 2015/16 (Figure 1).



**Figure 1:** Non-fatal drowning by year with crude drowning rate, 2002/03 to 2016/17, n=7,374

### Mean length of hospital stay

Between 2012/13 and 2016/17, the mean length of hospital stay ranged from 2.2 to 2.5 days, with an overall average of 2.3 days (Figure 2). The shortest mean hospital stays were recorded among young children aged 0-4 years (1.5 days), while the longest stays occurred among older people aged 75 years and over (5.9 days) (Figure 3). People hospitalised following a non-fatal drowning incident in natural water stayed for an average of 3.0 days, compared to 1.9 days for swimming pool incidents and 1.7 for bathtub incidents (Figure 4).

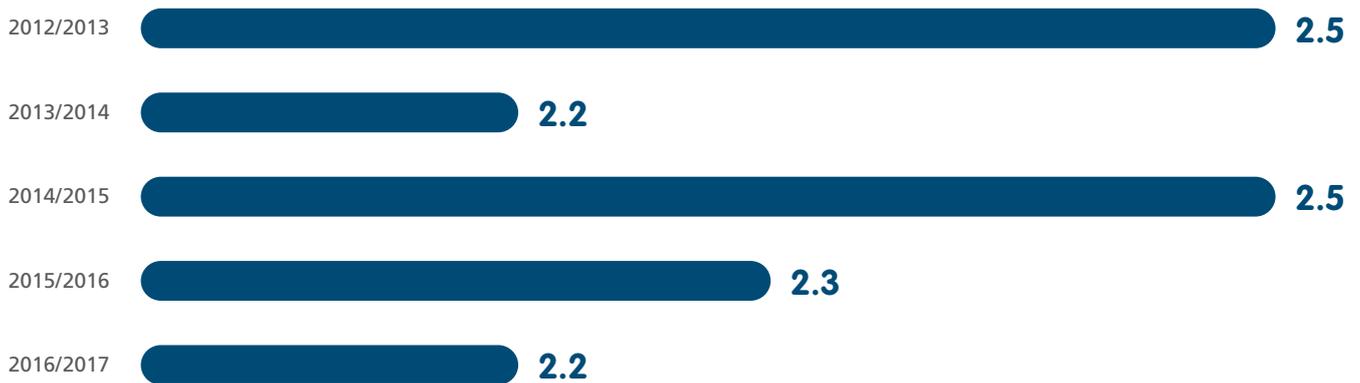


Figure 2: Mean length of stay in hospital (days), 2012/13 to 2016/17

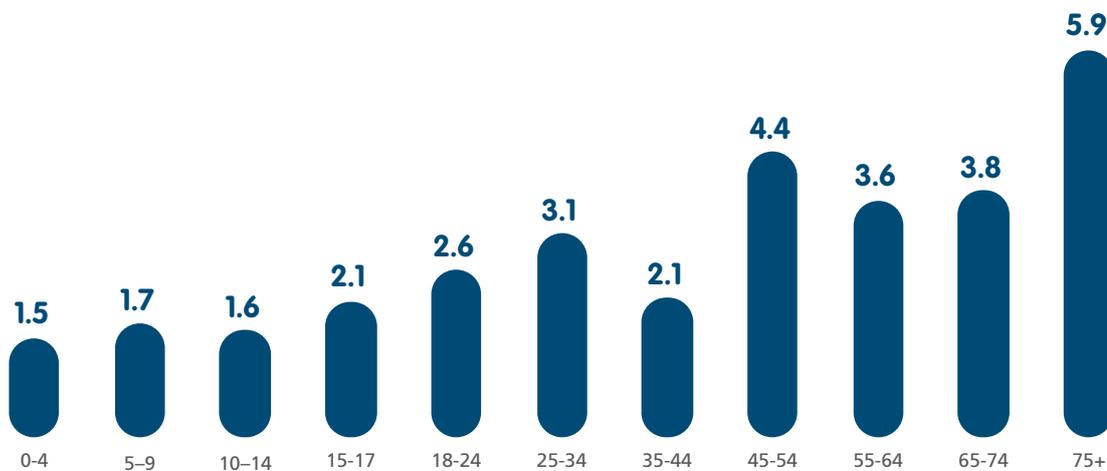


Figure 3: Mean length of stay in hospital (days) by age, 2012/13 to 2016/17



Figure 4: Mean length of stay in hospital (days) by location, 2012/13 to 2016/17

## Number of patient days

Between 2012/13 and 2016/17, the total number of patient days ranged from a high of 1,453 in 2015/16 to a low of 1,246 in 2013/14 (Figure 5). The highest total number of patient days were recorded among young children aged 0-4 years (1,665 days) and the lowest among adolescents aged 15-17 years (205 days) (Figure 6). Other or unspecified locations accounted for a total of 2,544 patient days, followed by 2,165 for natural water and 1,764 for swimming pools (Figure 7).

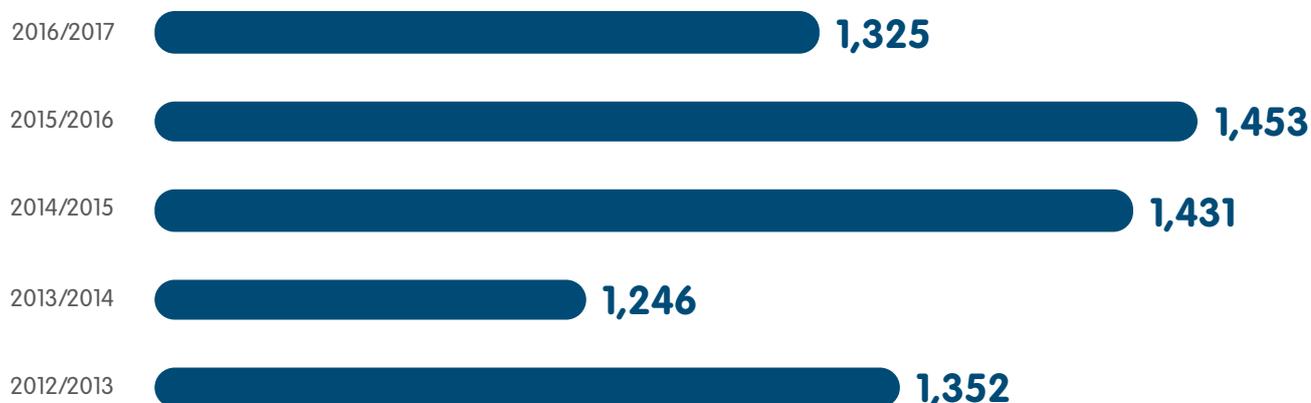


Figure 5: Total number of patient days, 2012/13 to 2016/17

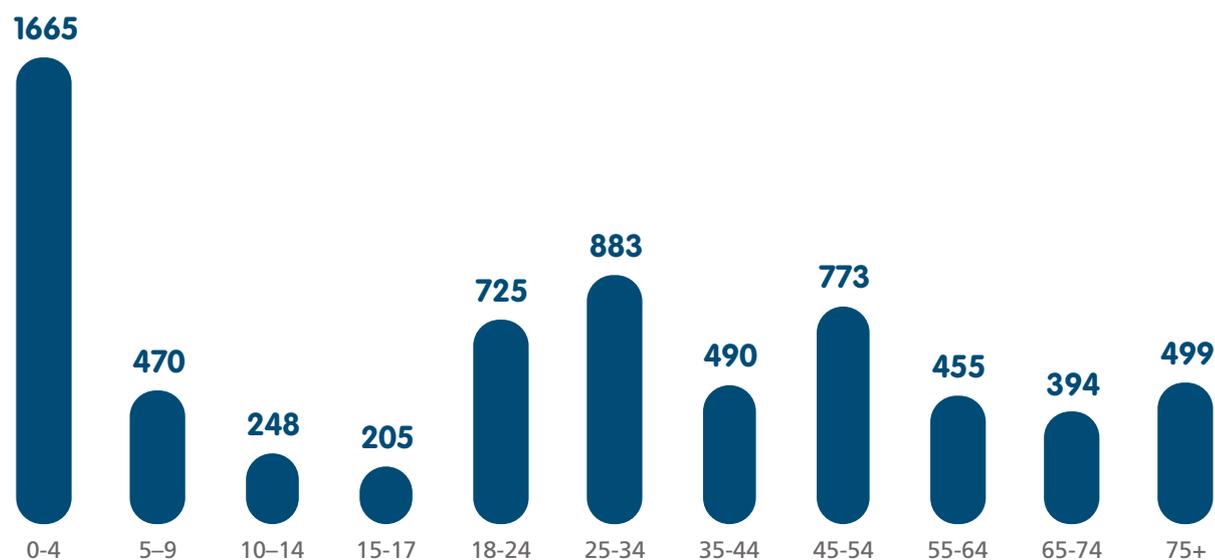


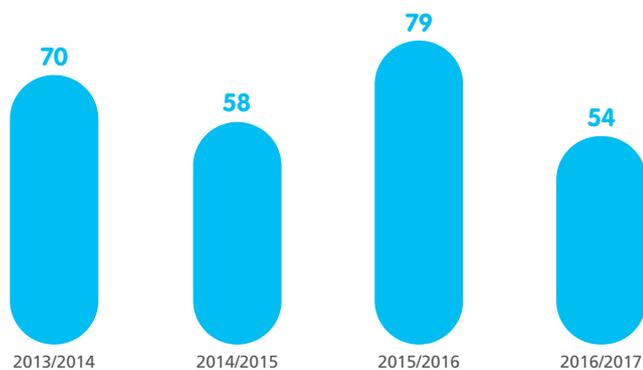
Figure 6: Total number of patient days by age, 2012/13 to 2016/17



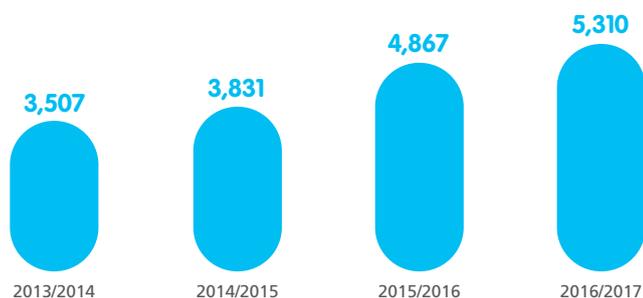
Figure 7: Total number of patient days by location, 2012/13 to 2016/17

## Intensive care (ICU)

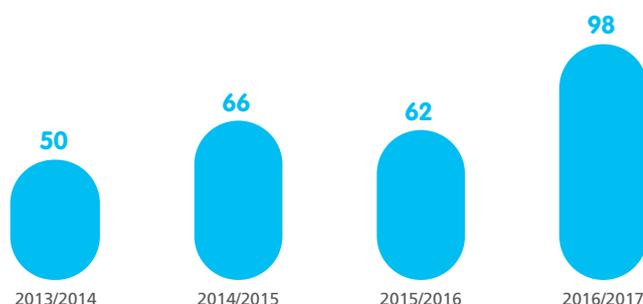
Between 2013/14 and 2016/17, there were 261 cases of non-fatal drowning which involved time in ICU. This is an average of 65 cases each year which require treatment within an ICU (Figure 8). The total number of hours in an ICU increased from 3,507 hours in 2013/14 to 5,310 hours in 2016/17. This is an increase of 51% over the study period (Figure 9). The average duration of time in ICU increased by 96%, from 50 hours in 2013/14 to 98 hours in 2016/17 (Figure 10).



**Figure 8:** Cases involving time in an Intensive Care Unit (ICU), 2013/14 to 2016/17, n=261



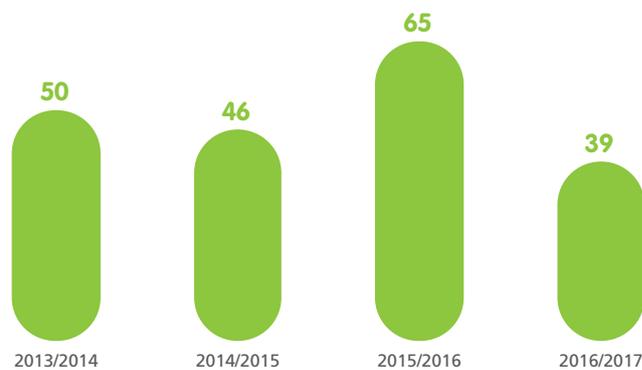
**Figure 9:** Total hours in an Intensive Care Unit (ICU), 2013/14 to 2016/17



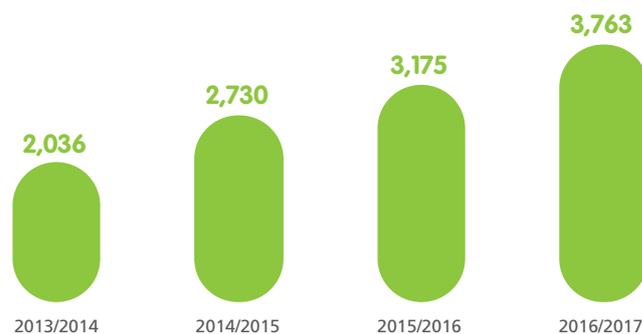
**Figure 10:** Average duration of time (hours) in an Intensive Care Unit (ICU), 2013/14 to 2016/17

## Continuous ventilatory support (CVS)

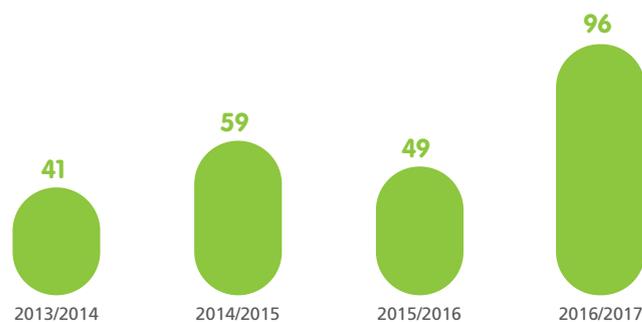
Between 2013/14 and 2016/17, there were 200 cases of non-fatal drowning which involved time on CVS. This is an average of 50 cases each year which require CVS (Figure 11). The total number of hours on CVS increased by 85%, from 2,036 hours to 3,763 hours (Figure 12). The average duration of CVS increased from 41 hours in 2013/14 to 96 hours in 2016/17. This is an increase of 134% (Figure 13).



**Figure 11:** Cases involving time on Continuous Ventilatory Support (CVS), 2013/14 to 2016/17, n=200



**Figure 12:** Total hours of Continuous Ventilatory Support (CVS) received, 2013/14 to 2016/17



**Figure 13:** Average duration of Continuous Ventilatory Support (CVS) (hours), 2013/14 to 2016/17

## REPORT HIGHLIGHTS

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- › The incidence of non-fatal drowning is rising, with hospitalisations increasing by 50% between 2002/03 and 2016/17.
  - By comparison, fatal drowning has decreased over this time (4). It is important that all drowning prevention campaigns include information on non-fatal drowning and promote the importance of cardiopulmonary resuscitation (CPR) and lifesaving skills.
- › Children 0-4 years recorded the shortest hospital stays, while older people aged 75 years and over recorded the longest stays.
  - Pre-existing medical conditions are more likely among older people, suggesting longer hospital stays are partly explained by more complex medical care (5). Particular caution with young children among medical practitioners may result in a large number of short admissions to allow observation in hospital.
- › The average duration of time in ICU and CVS increased substantially between 2013/14 and 2016/17.
  - As there is no clear trend in the number of cases requiring ICU or CVS treatment, this increase in treatment duration suggests an increase in incident severity. Further research is required to investigate this occurrence.

## NEXT STEPS

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### **Based on the findings of this report, the following next steps are recommended:**

- › Continue to highlight the full burden of drowning in public settings to raise awareness of those who survive a drowning incident
  - Expand drowning prevention messaging to incorporate non-fatal drowning, with a focus on child drowning prevention campaigns
  - Educate practitioners, policymakers and the media on correct terminology and reporting practices
  - Ensure reports on drowning include non-fatal drowning statistics alongside deaths and other water-related injuries
  - Use severity findings to signify the impact of non-fatal drowning and possible health consequences, including admission to ICU and requirement for CVS
- › Maintain collection and analysis of hospitalisation data to allow ongoing monitoring of trends and the identification of emerging issues of concern
- › Strengthen non-fatal drowning data collection, including the investigation of additional data sources to broaden data coverage and improve accuracy
- › Investigate long-term health, social and economic outcomes of non-fatal drowning, including impacts on families, communities and emergency responders
- › Ensure non-fatal drowning prevention messages reference the burden among adults as well as children, highlighting the likelihood of longer hospital stays among older adults
- › Investigate the causes of increasing total hours and average duration of ICU and CVS treatment, considering changes in incident severity and treatment practices over time

## > References

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