A 10 year analysis of drowning in children & adolescents aged 5-19 years in Australia:

THE FORGOTTEN 50%
Royal Life Saving Society - Australia

Royal Life Saving Society – Australia works to prevent drowning and facilitate healthy, active lifestyles by equipping all Australians with water safety skills.

There is no single reason why Australians drown, so there is no one simple solution. For that reason, our approach needs to reflect the complexity of the range of issues that result in drowning deaths.

To make sure we reach all Australians, whoever they are and wherever they live, we tackle these goals using an all encompassing approach, designed to meet our stakeholders’ diverse needs, beliefs and values.

Royal Life Saving is driven by:
• Innovative, reliable, evidence-based health promotion and advocacy;
• Strong and effective partnerships;
• Quality programs, products and services;
• Continuing as a committed national organisation.

For the past 119 years, Royal Life Saving has worked to harness the strengths of the communities we work with to reduce drowning and turn everyday people into everyday community lifesavers. As a dynamic, charitable organisation, our areas of activity include:
• Advocacy
• Education
• Training
• Health promotion
• Aquatic risk management
• Community development
• Research
• Lifesaving sport
• Leadership and participation
• International Partnerships

Our guiding values are safety, quality, integrity and a humanitarian tradition. Royal Life Saving is active all over Australia. Our State and Territory organisations, members, volunteers, trainers, employees and lifesavers are found in almost all communities. Our approach is inclusive and some of our biggest achievements occur away from large capital cities.

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Royal Life Saving has long campaigned to reduce drowning in children aged under five. Supervision, barriers, such as pool fences and child safe play areas, as well as water familiarisation and CPR education form the basis for drowning prevention programs for children aged under five years. These interventions are supported by years of research that have identified the problem and proposed, and evaluated, prevention strategies.

Drowning in children aged under five accounts for just over 50% of all child drowning deaths and has been described as a national disgrace. What then of the remaining 50%, which occur in children aged 5-19 years? Politicians, community members, educators and parents have all expressed concern, promoted the importance of swimming and water safety education and called for an increased commitment in its provision to all Australian children. Regrettably, we know and understand much less when it comes to preventing drowning in these later age groups.

In the 2010 National Drowning Report, for the first time since publishing this Report, Royal Life Saving provided a basic breakdown of child drowning by age groups 0 - 4, 5 - 9 and 10 - 14, by location and by activity. The response to this analysis was tremendous and prompted several further questions.

In an attempt to further understand the problem, this study provides a comprehensive analysis of fatal drowning in children aged 0 - 19 years in Australia over the period 1 July 2002 to 30 June 2012 (10 financial years), and a detailed analysis for the age groups 5 - 9, 10 - 14, 15 - 19, which covers school aged children and through adolescence.

Information for this report has been collected from State and Territory Coronial Offices, the National Coroner’s Information System (NCIS) and media reports. It has been collated and analysed by Royal Life Saving Society – Australia.

Royal Life Saving uses a media monitoring service (both electronic and print) all year round to identify drowning deaths in the media. This information is then corroborated with information from the NCIS, police and Royal Life Saving State and Territory Member Organisations before being included in this report.

All care was taken to ensure that the information is as accurate as possible. Please note that the figures from more recent years may change depending upon the outcomes of ongoing coronial investigations.

This report contains information correct as at 10 February 2013.

Exclusions from this data include: suicide, homicide, deaths from natural causes, shark and crocodile attack, or hypothermia where known. All information presented is about drowning deaths or deaths where drowning was a factor (e.g. car rolled into the water and a person drowned).

Child health and injury prevention organisations such as the World Health Organisation (WHO) define children as aged from 0 to 9 years and adolescents as aged 10-19 years, which has been adopted for analysis in this study. The operation of a boat is classified as ‘watercraft’. An intrastate visitor is defined as someone who drowned in a postcode that was 100km or more away from their residential postcode. The distance between the two postcodes was calculated using Google Maps. An interstate tourist is defined as someone who drowned in a postcode that was a different State to where their residential postcode was. An international tourist was someone who had a residential postcode as being from overseas and drowned in an Australian postcode.

Rates per 100,000 of population for an age group were determined by using Australian Bureau of Statistics (ABS) population estimates for that calendar year ending the financial year, for example the June 2003 statistics were used for the 2002-03 financial year rates.
Descriptive Epidemiology Of Drowning and Age Split

Between 1 July 2002 and 30 June 2012, there were 621 drowning deaths of children and adolescents aged 0 - 19 years old in Australia. Drowning in this age group peaked in 2005/2006 and 2006/2007, with 72 drowning deaths in each year, which was 20 more deaths than the lowest number of deaths recorded in the period of the study – 52, in 2004/2005 and in 2011/2012 (Figure 1, grey bars). The age group of children and adolescents between 5 - 19 years old accounted for 47% of all drowning deaths of children aged 0 - 19 in the 10 year period of this study.

If the circumstances of death were the same for all children regardless of age, the evolution of drowning deaths over time should be the same across age groups. However, when looking at the number of drowning deaths for the age groups 0 - 4 and 5 - 19 (Figure 1, dark and light blue bars, respectively) it is clear that that is not the case. While in the last 10 years, drowning deaths of children under 5 years old have dropped by 35% compared to the 10 year-average for that age group; the drowning deaths in the 5 - 19 years age group have not changed much. In this case, only a minor 5% decrease against the 10 year average for that age group was observed.

Additionally, Figure 1 also shows the rate of drowning deaths per 100,000 population. This offers a more balanced look into the burden of drowning to each age group. Not surprisingly, the ratio is much higher for children under 5 years old – this group represents a smaller portion of the overall population, when compared to the 5 - 19 age group. The most important feature, however, is that the sharp decline in the burden of drowning for the younger age group of the period of this study is not matched – at all – by the 5 - 19 age group. In fact, over the 10 year period of the present analysis, the burden of drowning in the 5 - 19 age group remained stagnant. In the end, the fact that only the younger age group has shown a downward trend resulted in a much less impressive outcome when looking at the overall drowning rate (0 - 19 age group, black line).

Over the last few decades many of the drowning prevention strategies and policies have targeted the 0 - 4 years age group, with swimming and water safety programs, and laws enforcing swimming pool fencing. However, in the 5 - 19 age group no significant improvements were observed, indicating that our efforts should focus on further understanding the epidemiology of drowning in this age group and on the study of strategies and methods to effectively reduce drowning among children and adolescents aged 5 - 19 years old. It is likely that a focused strategy to reduce and prevent drowning in this age group will lead to similar results to those observed for children under 5 years old.

KEY FACTS:

- Between 2002 and 2012, a total of 621 children and adolescents aged 0-19 drowned in Australia
- Of the 52 children and adolescents that drowned last year, 21 were 0 - 4 years old and 31 were 5 - 19 years old (36% below and 6% above the 10 year drowning average rate, respectively)
- The observed downward trend in child drowning in Australia appears to be almost exclusively linked to the sharp decline in drowning of children under 5
- The drowning rate for children and adolescents 5 - 19 years old remained unchanged throughout the 10 year study period
Gender Differences and Age Split

Between 2002 and 2012, males accounted for 77% of all drowning deaths in the 5 - 19 years age group compared to 63% of the drowning deaths in the 0-4 years age group (Figure 2, top three bars).

The predominance of males as drowning victims is even more evident in the late teen years (ages 15 - 19), as 87% of all drowning deaths in this age group involved males. This may be reflective of increased risk taking behaviour and exposure to drowning hazards in older boys that should be further explored. Conversely, females accounted for substantially lower percentages of drowning deaths in all age groups.

Despite the overall increased risk for males, it is interesting to note that up to the 15 - 19 age group males show a declining trend in drowning deaths, just as females do. The increasing ability for self-preservation is likely to be of key importance in this. It is really only at the older age group that a sharp deviation can be found, with drowning deaths of males aged 15 - 19 years old reaching higher numbers than any female age group, even those under 5 years old. In addition, drowning deaths occurred in higher numbers for males aged 5 - 19 years old compared to those registered in the age group 0 - 4 (227 vs. 207, respectively). Engagement in riskier sports and other activities during this stage of life is likely to play a major role in driving this change.

KEY FACTS:
- Of all children, aged 0 - 19, drowning in Australia in the 10 year period of the study, 70% were males
- For every 7 children aged 15 - 19 years old that drowned, 6 were males
- The impact of gender on drowning deaths is less evident for the age groups 0 - 4 and 10 - 14, where the difference between drowning deaths among males and females is modest (37% for each group)
- Males aged 15 - 19 years old exhibit the second highest number of drowning deaths, higher than any female age group

Figure 2 – Drowning deaths by sex and age group, between 1 July 2002 and 30 June 2012 (N=621)
Season
It is a common misconception that drowning deaths occur only in the summer months. Analysis of the 10 year drowning data shows that drowning deaths in the 0 - 19 years age group occur all year round with the highest numbers in Summer, followed by Spring (Figure 3).

This means that although the summer months are indeed the ones with the highest number of drowning deaths, drownings do occur outside Summer in significant numbers. There is no significant difference between age groups regarding the season of the incident.

The seasonality of drowning deaths is more evident for the age group 5 - 19 with the Summer months being responsible for 48% of all drowning deaths in this age group. At the same time, it is important to further investigate and understand how incidents occur in the remaining months of the year, since they account for the remaining 52% of the drowning deaths in this age group.

Overall, the effect of seasonality was not dependent on the age group.

Figure 3 – Drowning deaths by season and age group, between 1 July 2002 and 30 June 2012 (N=621)

KEY FACTS:
- Drowning deaths don’t occur only in the Summer months
- 48% of drowning deaths of children aged 5 – 19, occurred in Summer, while 39% occurred in Spring or Autumn and 13% in Winter
- The highest numbers occurred in Summer followed by Spring and Autumn
- 53% of all drowning deaths occurring in Summer are of children aged 5 – 19, corresponding to 23% of drowning deaths occurring all year round for children and adolescents aged 0 to 19
Month

When looking at drowning data regarding the month of incident (Figure 4) it is clear that higher numbers are observed in January and December, with February following close by, except for the age groups 0 – 4 and 5 – 9, where November is third.

May was the single month in which numbers of drowning deaths, on average, fell below 10 in the period of the study. The month in which fewer children aged 0 – 4 years drowned was June with the rest of the numbers ranging from 15 to 54 per month in the remaining months of the year. While for the 5 – 19 year olds, May was the month that averaged the least drowning deaths.

Constantly low numbers of drowning deaths per month were observed for the age group 10 – 14 years throughout the year. But when looking at drowning deaths in the age groups 5 to 9 and 15 to 19 years old, large differences between the Summer and Winter months are evident.

The heatmap depicted in Figure 5, where drowning deaths are represented by month per financial year, unveils important differences in the numbers of drowning deaths occurring in January and December for some particular years, across the 10 year period of this report. The highest numbers of drowning deaths per month were observed in January 2011 with 18 children aged 0 – 19 drowned. Across the 10 year period of the study (120 months), there were no drowning deaths of children aged 0 – 19 in June 2005, May 2007, May 2008, July 2009 and June 2010.

When examining the activities being undertaken immediately prior to drowning during January and December, falls outnumbered all other categories. The only exception was January 2009, where swimming and recreating was the leading aquatic activity being undertaken. Regarding location, natural water bodies were the locations where most drowning deaths occurred.

Figure 5 – Heatmap of drowning deaths by month and financial year for children aged 5-19, between 1 July 2002 and 30 June 2012 (N=293)

KEY FACTS:

• Uneven distribution of drowning per month vs. age groups
• January was the month in which more children drowned in Australia in the 10 year period
• For the youngest age groups (0 - 9) drowning incidents occurred mainly during November, December and January
• Children and adolescents aged 10 - 14 drowned mainly during January and February, but numbers are consistently lower than the remaining age groups
• The incidence of drowning deaths in ages between 5 – 19 is larger in January and December, with average drowning rates dropping to as low as 5 in May
• Some years show important differences between drowning deaths occurring in the 2 high-season Summer months (December and January)
• In Summer months with the highest numbers of drowning deaths, natural water bodies and falls were the main locations and activity surrounding drowning deaths of children aged 0 - 19
• There were no drowning deaths in June 2005, May 2007, May 2008, July 2009 and June 2010
Day of the Week

Weekends were, generally, when most deaths occurred with Sundays registering higher numbers in the age groups 5 – 9 and 15 – 19. Interestingly, for children and adolescents aged 5 – 19, drowning deaths dropped on Tuesdays and Fridays with the latter being more evident for those aged 5 – 14.

For children aged 0 – 4 years old, there are no significant differences in drowning deaths over the days of the week. Children of this age group drowned mainly in home environments (such as bathtubs, spa baths and swimming pools) which is consistent with the fact that they are evenly exposed to risk factors throughout the week. In contrast, the occurrence of drowning deaths in the age group 5 – 19 is uneven across the week. This reflects the diversity of activities and their impact on the frequency of drowning incidents. Interestingly, Mondays and Thursdays were the weekdays with higher numbers of drowning deaths for adolescents aged 15 to 19 years, however differences in figures are too small to detect a significant effect. Drowning deaths occurring on Mondays and Thursdays were not related to Public Holidays.

Notably, when looking at the number of drowning deaths occurring all year without considering the summer school holiday months, we realise that drowning deaths occurred mainly during weekends for all age groups of children and adolescents under 20 years old except for children aged 0 to 4 years old. This may be a sign of reduced exposure as a result of schooling between 5 and 19 years old.

**KEY FACTS:**
- Sunday was the day when most deaths occurred
- Other days with high numbers of drowning deaths included Saturdays, Thursdays and Fridays
- The occurrence of drowning deaths in the age group 5 – 19 is uneven across the week, but still higher on weekends
State and Territory

New South Wales was the State with more drowning deaths of children aged 5 - 19 between 2002 and 2012, with 94 deaths (32% of all drowning deaths in that age group for that period). Queensland was the State with second highest drowning deaths numbers, with a total of 81, followed by Victoria with 50 deaths. When examining data per 100,000 population, the rates were: 6.9 in New South Wales, 9.4 in Queensland and 5.6 in Victoria. The majority of drowning deaths of children aged 5 - 19 occurred in Sydney and Brisbane areas, followed by Melbourne and Perth.

Of the 293 children and adolescents (5 - 19 years) who drowned over the last 10 financial years, 61 (23%) were visitors to that location. This included: 9 overseas visitors, 18 interstate visitors and 34 intrastate visitors where travel was greater than 100 km.

The proportion of drowning deaths involving visitors and non-visitors was higher in males than females (32% vs. 23%, respectively), once more pointing to the adventurous nature of males.

Remoteness Classification of Incident Location and Visitor Status

Regarding the remoteness classification of incident location, Major Cities, held the highest numbers of drowning deaths (Figure 8). Very remote locations had a higher drowning rate than remote locations. In very remote locations the large difference in numbers, compared to remote locations, was in the visitor status. In very remote locations, 23 non-visitor children and adolescents aged 5 - 19 drowned. The number of non-visitor children and adolescents aged 5 - 19 that drowned in remote locations was 10, nearly half of those who drowned in very remote locations.

When examining the data per age group, it is possible to identify different trends between children aged 0 - 4 and 5 - 19. While for children in the age group 0 - 4, both remote and very remote locations accounted for 4.3% of drowning deaths, for those aged 5 - 19, 8.2% drowned in very remote areas while 3.6% in remote areas. This might be a result of increased exposure and risk taking behaviour of children and adolescents aged 5 - 19, with a parallel decrease in access to emergency services. However, the reasons why this happens should be further investigated and a specific strategy to reduce drowning deaths of non-visitors aged 5-19 years old in very remote areas should be put into practice.

Children under 5 mainly drowned in home aquatic environments, and, predictably, numbers are higher where population numbers are too. The difference among the first 3 remoteness index categories is not that evident for children aged 5 - 19 years old, where major cities accounted for 38.1% of all deaths, but inner regional and outer regional location are still high, 25.6 and 24.2%, respectively.

In short, all data pertaining to ‘Where’ drownings occurred, hints towards an eventual relationship between familiarisation with the location and risk taking behaviours, which should be further investigated.

Figure 7 – Drowning deaths by incident postcode for children aged 5 - 19, between 1 July 2002 and 30 June 2012 (N=293)

KEY FACTS:

- New South Wales accounted for 32% of all drowning deaths of children and adolescents aged 5 - 19 in Australia, in the 10 year period of this report
- Sydney and Brisbane city areas were the areas with highest numbers of drowning deaths, followed by Melbourne and Perth
- Most incidents occurred with non-visitors (77%)
- Proportionally, males drowned more in locations they were likely to be familiar with
- Drowning deaths were higher where population density is too
- Children aged 5 - 19 years old drowned more in very remote areas than in remote areas
Aquatic Environment Where Drowning Occurs

The different distribution of drowning locations by age groups, depicted in Figure 9, emphasises the importance of different approaches for drowning prevention in children and adolescents aged 5 - 19 in Australia. While children aged 0 - 4 drowned mainly in home aquatic environments (bathtubs, spa baths and swimming pools), children aged 5 - 19 drowned not only in swimming pools but in rivers, lakes, beaches and ocean environments.

Regarding seasonality, drowning deaths of children aged 5 - 19 occurring in summer were mainly located in natural water bodies such as rivers, creeks, lakes, lagoons, dams, beaches and other. There is an expected shift of those numbers when season changes.

For example, during winter, swimming pool drowning deaths outnumbered other locations, while during spring and autumn, rivers, creeks and streams were the main locations where children 5 to 19 years old drowned. The uneven distribution of drowning locations per season further emphasises the need to have different approaches for drowning prevention in children and adolescents aged 5 - 19 compared to children under 5.

Drowning incidents were likewise unevenly distributed through the days of the week. Beach related drowning deaths were more frequent on Tuesdays, Thursdays and Sundays, while river related drowning deaths were more frequent on Sundays. Bathtub and spa bath drowning incidents were more frequent on Saturdays. Once again, the differences between values are not large enough to infer a probable cause to explain that effect or if it is happening just by chance.

Usually, in most locations, drowning deaths occurred involving non-visitor children and adolescents, which might indicate they were familiar with the location of incident. Nevertheless, as much as 52% of drowning deaths occurring in the ocean and/or harbours involved visitors; and 22% of drowning deaths occurring in rivers, creeks and streams, involved visitors as well.

KEY FACTS:
- There is greater diversity in the location where drowning occurs for 5 - 19 year olds
- 5 - 19 year olds drowned mainly in natural water bodies such as rivers, creeks, lakes, lagoons, dams, beaches and other
- Under 5 year olds predominantly drowned at home
- Beach related drowning deaths were more frequent on Tuesdays, Thursdays and Sundays
- River related drowning deaths were more frequent on Sundays

Figure 8 – Drowning deaths by remoteness classification of incident’s location for children aged 0-19, between 1 July 2002 and 30 June 2012 (N=621)

<table>
<thead>
<tr>
<th>Remoteness</th>
<th>Percentage</th>
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<tr>
<td>Major Cities</td>
<td>38.1%</td>
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<tr>
<td>Inner Regional</td>
<td>25.6%</td>
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<tr>
<td>Outer Regional</td>
<td>24.2%</td>
</tr>
<tr>
<td>Remote</td>
<td>3.6%</td>
</tr>
<tr>
<td>Very Remote</td>
<td>8.2%</td>
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Figure 9 – Drowning deaths by location and age group for children and adolescents aged 0 - 19, between 1 July 2002 and 30 June 2012 (N=621)

<table>
<thead>
<tr>
<th>Location</th>
<th>0 - 4</th>
<th>5 - 19</th>
</tr>
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<tbody>
<tr>
<td>swimming pool</td>
<td>168</td>
<td>44</td>
</tr>
<tr>
<td>river, creek, stream</td>
<td>28</td>
<td>95</td>
</tr>
<tr>
<td>lake, dam, lagoon</td>
<td>33</td>
<td>38</td>
</tr>
<tr>
<td>bathtub, spa bath</td>
<td>48</td>
<td>18</td>
</tr>
<tr>
<td>beach</td>
<td>2</td>
<td>41</td>
</tr>
<tr>
<td>ocean, harbour</td>
<td>46</td>
<td>30</td>
</tr>
<tr>
<td>other</td>
<td>46</td>
<td>27</td>
</tr>
</tbody>
</table>
An analysis of drowning deaths by activity immediately prior to drowning shows that the number of falls into water declines from 49% for 0 - 19 years old to 18% in the 5 - 19 age group. When looking at each main age group separately, a clear shift in activities immediately prior to drowning is observable. Falls and bathing are the main activities for children under 5, accounting for 77% and 14% of all drowning deaths, respectively. In contrast, the main activities for children and adolescents aged 5 to 19 years old, accounting for 36%, 18% and 11%, respectively. Younger children of the latter age group (i.e., aged 5 to 9) were still mostly falling into the water prior to drowning (36%) and 25% of children aged 5 to 9 years drowned after swimming and recreating. In later childhood and adolescence (age group 10 - 19) swimming and recreating was the main activity immediately prior to drowning, accounting for 40% of all drowning deaths in that age group. This may have occurred due to the fact that children aged 5 - 9 still lack the basic swimming and water safety skills needed to survive a fall into the water. On the other hand, older children drowned while recreating in inland waterways, most likely due to a lack of adequate supervision, underestimation of water hazards and overestimation of aquatic skills.

Swimming and recreating, the main activity immediately prior to drowning of children aged 5 - 19, was more frequent during summer months (December through February), 4 times higher than the second highest season (Autumn).

Since most falls into the water occurred with children under 5, and mostly in home aquatic environments, it is not surprising to see that falls happened in high numbers all year round.

All States and Territories of Australia with the exception of Tasmania, showed a similar trend regarding activity immediately prior to drowning, with falls being the main activity immediately prior to drowning, followed by swimming and recreating. In Tasmania watercraft related drowning deaths represented one third of all drowning deaths.

**KEY FACTS:**
- Activities immediately prior to drowning of the 5 - 19 age group greatly differed from those of children under 5 years old
- Falls into water declined from 49% for 0 - 19 years to 18% in the 5 - 19 years age group
- In Tasmania, watercraft related drowning deaths represented one third of all drowning deaths in that State.
Of the 621 drowning deaths that occurred in the 0 - 19 years age group, there were 47 cases where alcohol was known to be involved – 8% of all drowning cases in that age group. Of these 47 cases, 87% were males. 74% of all alcohol related drowning deaths occurred with male adolescents aged 15 to 19, accounting for 24% of all drowning deaths in this age group.

These numbers are a major concern for this age group and an effective drowning prevention strategy specific for adolescents aged 15 to 19 years old must address responsible alcohol consumption. The numbers presented here for drowning deaths involving alcohol could be more accurate if that information was available for all cases. For ages between 0 and 19 years old, the association of alcohol is unknown for 40% of all cases.

The highest number of cases involving alcohol occurred in the 15 - 19 years age group with 79% of all cases related to alcohol in children.

The top 3 States where alcohol related drowning deaths were more frequent were New South Wales (N=19), Queensland (N=8) and Western Australia (N=7). It is important to look at these numbers considering them as a ratio of all drowning deaths occurring in that State.

In the Northern Territory 38% (N=5) of all cases were alcohol related, followed by Western Australia where 23% (N=7) of all drowning deaths were alcohol related. The largest number of drowning deaths involving alcohol occurred in rivers, creeks and streams (42%), followed by beach (22%) and ocean and harbour locations (16%).

The most common activity immediately prior to drowning was swimming and recreating (44%), followed by falls and watercrafts, both representing 11% of the total.
Drowning in children and adolescents aged 5 to 19 years in Australia is a significant issue that has been neglected due largely to the comprehensive efforts to reduce the high rates of drowning experienced in children under 5 since the 1980's.

Drowning in the 0 - 4 years age group has been well documented, and there is a widespread acceptance of prevention strategies such as supervision, isolation swimming pool fencing and child safe play areas. By focusing analysis on the life stages within the 5 - 19 years age range, this report sought to identify drowning patterns and guide the development and strengthening of further drowning prevention strategies. Numbers detailed in this report show that a significant reduction of 57% in drowning deaths was observed for children under 5, during the 10 year period of the study.

However, children and adolescents aged 5 to 19 have drowned at steady rates per 100,000 population without considerable change in the number of cases between 2002 and 2012. The overall reduction in drowning deaths in the age group 0-19 years (31%) was, therefore, mainly due to a reduction of drowning deaths in the under 5 age group. This strongly points towards the need to develop new and specific strategies targeting the reduction of drowning deaths in children and adolescents between 5 and 19 years old. The aim would be to repeat the success attained for children under 5, and contribute to achieving the goal of the Australian Water Safety Strategy 2012 – 2015 – “reduce drowning deaths in children and young people (0 - 24) by 2020”.

Although most children under 5 drown in home environments, the number of children who drown at open-water locations, such as beaches, rivers and lakes, increases with age, due to a varied set of circumstances, as this report details.

In the age group 5 - 9, children begin to engage more with their peers and begin school, yet they still require a high level of supervision from parents and carers. Most children of this age (54%), drowned in swimming pools and rivers, creeks and streams, while 15% drowned in lakes, dams and lagoons, reinforcing the need for differentiated drowning prevention strategies adjusted to specific locations, which, for this age group, correspond mainly to inland waterways.

The relatively high numbers of falls (36%) in the age group 5 - 9 might still be due to low/absent swimming skills and a lack of adequate supervision by caregivers. At the same time, a concerning 25% of all cases occurred after the child was swimming and recreating. High rates of drowning in children less than 5 years old, has fuelled the discussion about the efficacy of swimming lessons as a drowning prevention strategy in children as young as 6 months. In a case control study, Brenner 1 found an association between participation in formal swimming lessons and an 88% reduction in drowning in children 1 - 4 years.

Whilst it may be feasible to teach swimming skills to children 1 - 4 years, a study by Blanksby (42) in 1995 comparing the number of lessons taken by children to reach a benchmark of 10 metres of front crawl found that children aged five took substantially fewer lessons to achieve this milestone than children who commenced at age 2, 3 or 4 years. In 2010 the American Academy of Pediatrics issued a statement 3 noting it supports swimming lessons for children 4 years and older. The statement allows parents to decide when children begin to learn water survival skills between 1 - 4 years of age but cautions against the notion of “drownproofing”.

Although little is still known about the impact of swimming lessons as a drowning prevention strategy among children in that age group, evidence is rapidly accumulating that a basic level of water safety knowledge, coupled with a basic level of swimming skill (often called survival swimming) is sufficient to prevent most drowning episodes 4-7. In Australia, advocates 8 point to a decline in swimming abilities among primary school aged children and propose that it may be a factor in the high number of drowning deaths that occur among people in later life stages.

It is worth mentioning that, at the same time, throughout the debate, besides describing the potential benefits as a population wide strategy 8-10, research 12,13 has also pointed to increases for risk taking behaviour and a decrease in the quality and amount of supervision by carers.

In fact, parent’s perceptions of children’s supervision needs are a matter of concern, especially for children aged 5 - 9 years old. Parents have been found not to worry about their children drowning and may even believe that there are some situations in which children do not require adult supervision, including if the child can swim 14. Furthermore, research shows that many parents are unsure or ill informed about the circumstances surrounding most child and adolescent drowning deaths 13,14. In a study conducted in New Zealand, 4 in every 10 parents erroneously believed that neighbourhood creeks posed a greater danger to toddlers than domestic swimming pools 15.

Those misconceptions are accentuated as children age, because parents naturally assume their children have acquired the swimming skills needed to be safe in water. A study by Moran and Stanley 16, showed that an informal parent education program run in conjunction with swim school lessons improved parental awareness of toddler water safety. So, informing parents about the circumstances that typify child drowning could be a valuable adjunct to all parents in a community-based safety education program 16. Water safety education initiatives emphasising the importance of supervision of young children, 5 - 9 years old, at natural water bodies, such as beaches, rivers, creeks and lakes, should also be promoted, to counter any current misconceptions 13.
As they grow, children and adolescents aged 10 - 14 may show self-consciousness about learning new skills which provides strength for the argument of commencing swimming lessons at a younger age. The increased access to unsupervised water is a key safety issue for this age group. Drowning prevention strategies specifically targeting this age group should look at the risk taking behaviours being undertaken around different aquatic locations and address them in an educative way.

Adolescents (15 - 19) gain independence and increasingly rely on their peer group and lifeguards for supervision. Risk taking behaviour and the use of alcohol around water can increase in this age group, and, adolescents may not be comfortable admitting a lack of swimming skills. An increase in risk taking behaviours, the use of alcohol and exposure to unsupervised natural water bodies swimming locations, the diversity of drowning locations and activities all make prevention a significant challenge. Overarching concepts of water safety for this age group should reinforce the need for swimming and water safety education during the primary and secondary school years.

While falls have been identified as the main activity being undertaken immediately prior to drowning in the 0 - 4 years age group, swimming, recreating (near and in water), and watercraft, have been identified as the main activities when examining drowning deaths in the 5 - 19 year age group. These differences underscore the need for a differential approach towards drowning prevention for these two dissimilar age groups.

Present policies advocating pool fencing, as well as other barriers around water and parental supervision, still remain the most important prevention strategies to reduce drowning in young children aged 0 to 4 years. The present report shows, however, that, for children and adolescents aged 5 to 19, the best approach might have to include behaviour-focused strategies that not only emphasise caregiver supervision but also teach parents and children water safety and swimming skills.
We cannot be satisfied with incremental improvement. We must act decisively to achieve a dramatic and significant reduction in drowning deaths among children and adolescents aged 5 – 19 years old in Australia of a similar or greater magnitude to the reduction achieved in 0 - 4 in recent decades.

Even though, there is no single prevention strategy for ensuring children and adolescents between 5 and 19 do not drown, data from the last 10 years strongly suggests that a comprehensive approach should incorporate passive protection (such as water barriers and Personal Flotation Devices), active measures (such as water safety and swimming instruction, risk identification and mitigation in known swimming locations presenting higher risk) and parental awareness and supervision.

We urge water safety agencies, government and other groups interested in preventing drowning to focus their efforts on implementing strategies to specifically address drowning prevention in the 5 - 19 years age group.

**KEY RECOMMENDATIONS INCLUDE:**

- Continuation of the principles associated with prevention in the 0 - 4 years age group, into the 5 - 9 year olds. This includes strengthening programs that raise awareness and build skills in pool fencing and parental awareness and supervision.

- Implement systems that ensure the acquisition of skills, such as survival swimming and basic rescue, by all primary school aged children to build resilience through the use of knowledge and skills in the face of increased exposure to risks and hazards both across childhood and adolescence, and throughout adulthood.

- Promote community wide rescue and resuscitation skills. This is particularly important for kids in early secondary school, since evidence shows that early CPR and a short amount of time between immersion and commencing CPR can have a beneficial outcome. Promoting community wide rescue and resuscitation skills also assists in creating more skilled first responders in remote and very remote areas where timely access to emergency help may be difficult.

- Understand, by conducting research, the risk perceptions of the 15 - 19 year olds that might be influencing their risk taking behaviours. Particularly, the use of alcohol and drugs while in and before going into water, as they are increasingly pressured by their peers as they age and gain independence to engage in aquatic activities without carer supervision.

- Develop programs that provide skills and knowledge for safe water participation and modification of risk taking behaviour by young people which aim to reduce drowning.

- Increase access to inland waterway safety programs, especially for people living in very remote areas.

- Address infrastructure and human resources in rural and remote areas to ensure adequate coverage of aquatic instructors and safety risk management.
REFERENCES


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