

# Lack of caregiver supervision: a contributing factor in Australian unintentional child drowning deaths, 2000–2009

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Drowning ranks as a leading cause of unintentional injury-related deaths of children worldwide, but the quality and availability of data on child drowning varies across countries,<sup>1</sup> hampered by differing surveillance systems and the lack of an internationally accepted definition of drowning.<sup>2</sup> Much contemporary literature on drowning is from developed countries, with well established surveillance or coronial systems. It is therefore unlikely that drowning cases in these countries are misclassified or overlooked.<sup>1,3,4</sup>

When child drownings occur, a lapse in or lack of caregiver supervision is often cited as a contributing factor.<sup>3–6</sup> Studies using retrospective case-series review designs to investigate the relationship between supervision and child drowning have predominantly focused on: (i) children aged  $\leq 5$  years; and (ii) specific settings, particularly bathtubs, private pools and dams.<sup>3,5,6</sup> Information gained from such reviews is valuable for prevention. However, restricting analyses to very young children and particular aquatic settings makes it difficult to fully understand the role of supervision in drowning, and to appropriately target, design, implement and evaluate child drowning prevention strategies that focus on caregiver supervision of all children.

As unintentional deaths should be reported to a coroner or medical examiner,<sup>7</sup> coronial data are very useful for investigating drowning deaths, particularly as these data are considered accurate and highly sensitive.<sup>7–9</sup> Detailed narrative documents within such records, generally compiled soon after the event, provide a wealth of information about circumstances surrounding drowning incidents.<sup>9</sup> This level of detail on injury aetiology, which is not always captured within the International Classification of Diseases (ICD) codes,<sup>10</sup> has contributed to the identification of drowning risk factors and the prevention of drowning deaths, in Australia and internationally.<sup>11,12</sup>

The National Coroners Information System (NCIS), managed by the Victorian Institute of Forensic Medicine and funded by state and federal agencies, provides detailed information for all coronial jurisdictions in Australia,<sup>13</sup> and very good coverage of Australian injury deaths.<sup>14,15</sup>

## ABSTRACT

**Objectives:** To establish how frequently supervision was explicitly identified as a factor in coroner-certified unintentional drowning deaths of children in Australia, and to determine the percentage of cases where failure of supervision may have been a contributing factor; also, to identify the proportion of cases with coroners' recommendations relating to supervision and unintentional child drownings.

**Design and setting:** Retrospective case-series analysis of unintentional drowning deaths of children (aged 0–14 years) in Australia from 1 July 2000 to 30 June 2009, based on data from the National Coroners Information System (NCIS).

**Main outcome measures:** Number of unintentional child drownings and the extent to which supervisory factors were formally reported by coroners as a contributing factor; proportion of cases with coroners' findings that also had coroners' recommendations.

**Results:** 339 relevant child drownings were identified within the 9-year period. Supervision (or lack thereof) was identified as a contributing factor in 71.7%. However, specific detail about the nature and extent of supervision varied across these cases. The availability of text documents describing the findings (police reports, coroners' findings, autopsy reports, toxicology reports), and the level of detail within these documents, also varied considerably across jurisdictions. Despite almost half (47.2%) of the closed cases having coroners' findings attached, only 15% of these also included specific coroners' recommendations.

**Conclusion:** Lack of adequate supervision, or lack thereof, is a significant problem associated with fatal drownings of children in Australia. There is a need to improve the standard and consistency of information contained in text documents within the NCIS to provide more useful information for preventing child drowning deaths.

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In this study, we used the NCIS database to investigate drowning deaths among children aged 0–14 years in Australia, over 9 years from 2000 to 2009. We aimed to: (i) establish how frequently supervision was explicitly identified as a factor in child drowning; (ii) determine the number of cases in which a lapse in or lack of supervision was considered a contributing factor, although not documented as such in police reports or coronial findings; and (iii) identify the frequency of coroners' recommendations.

## METHODS

### Case identification

All unintentional drowning deaths (open and closed cases) of children aged 0–14 years from 1 July 2000 (1 January 2001 for Queensland) to 30 June 2009 were extracted from the NCIS database, using the "query design" function and search criteria of mechanism of injury of "threat to breathing" and "drowning/near drowning".

Identified cases were screened by one of us (LAP) and retained if they met the following criteria:

- the drowning occurred between 1 July 2000 and 30 June 2009;
- the coronial investigation was closed before 30 June 2009;
- the child was aged 0–14 years;
- the injury mechanism was drowning; and
- the intent notification/completion was "unintentional".

Duplicates and non-drowning cases (eg, crocodile attack, car accidents, or natural causes) were excluded.

For each NCIS closed case, up to four text documents (police narrative, autopsy and toxicology reports and coronial findings) provide rich information about the circumstances surrounding the injurious incident and death.<sup>15</sup> The actual number of documents available for each case depended on NCIS access to electronic versions and whether all procedures were conducted for the case. For example, in some instances, a toxicology screen or autopsy, or both, may

## 1 Classification scale of the extent to which supervision was identified as a contributing factor to child death by drowning in closed coronial cases

Strength of evidence	Extent to which supervision was identified or clearly ruled out	No. of cases	Examples
Weakest	Unknown (no text documents attached to the case)	9 (2.7%)	
	Inadequate details in text documents to determine whether supervision was a factor	58 (17.1%)	<ul style="list-style-type: none"> <li>Police report states only that child was missing and later found in pool.</li> <li>Police report only attached to case, which states that caregiver found child floating face down in pool.</li> </ul>
	"Supervision" (or equivalent terms) not identified in text documents, but one of a number of contributing factors	87 (25.7%)	<ul style="list-style-type: none"> <li>Child wandered away unnoticed while caregiver was working. Child later found in river.</li> <li>Child observed riding bike in driveway. Approximately 15 minutes passed and the caregivers noticed child missing. Found in the dam.</li> </ul>
	"Supervision" (or equivalent terms) not identified in text documents but clearly a key contributing factor*	96 (28.3%)	<ul style="list-style-type: none"> <li>Caregiver left child unsupervised in the bath for a period of 2 to 10 minutes.</li> <li>Father reading paper and instructed siblings to watch child.</li> </ul>
	"Supervision" (or equivalent terms) identified as a factor in text documents†	60 (17.7%)	<ul style="list-style-type: none"> <li>No adults exercising close supervision at the time the child drowned.</li> <li>Low level of carer supervision immediately before the incident.</li> </ul>
	"Supervision" not a contributing factor	29 (8.5%)	<ul style="list-style-type: none"> <li>Child was a passenger in a vehicle which was swept off the road during storms and flash flooding.</li> <li>Boat overturned in rough conditions.</li> </ul>
Strongest			

\* For supervision, or lack thereof, to be identified as "a key contributing factor", the reports had to specifically state that the caregiver left the child unattended in an aquatic setting. † Police narratives and coroners findings.

not have been performed. The NCIS does not contain transcripts of inquests, photographic evidence or witness statements.

### Assessment of supervision

Supervision was defined according to a published model in which a combination of three dimensions (attention, proximity and continuity) is required to define supervisory behaviour, with supervision increasing as one or more supervision dimensions increases.<sup>16</sup> Unfortunately, most retrospective aquatic studies are limited by only considering continuity of supervision. Consequently, for this study, we developed a quality rating scale to assess the extent to which supervision was identified as a contributing factor in drowning cases (Box 1), rather than to categorise cases according to the holistic measurement of supervision as has been reported previously.<sup>17</sup>

A coroners' screen search, which allows word searching of NCIS-attached text documents, was conducted to identify cases in which supervision was clearly mentioned as a contributing factor. This search was restricted by child age (0–14 years) and to closed cases, and was conducted using the search terms "drown" or "immersion", in conjunction with "supervision" or "unsupervised" or "unattended". Words derived from applicable terms (eg, supervise, supervising, supervised) were also incorporated.

All closed cases of child drowning retained from the query design (but not

identified in the coroners' screen search) were then manually searched. Content analysis of text documents (when present) was used to understand the circumstances surrounding the drowning and to determine whether a lapse in or lack of supervision may have contributed. This process further enabled classification of case reports according to the extent to which supervision was identified.

### Ethics approval

This study was approved by the University of Ballarat Human Research Ethics Committee, the Victorian Department of Justice Human Research Ethics Committee and the Western Australian Coronial Ethics Committee.

### RESULTS

Overall, 401 cases of drowning were identified, of which 339 cases met our inclusion criteria. Cases that were eliminated on the grounds of intent comprised: 15 because intent was identified as assault; six because intent was unknown or undetermined; and three because they were due to natural causes. Further cases that were removed from the analysis comprised: 16 identified as duplicates; 14 that were still open; four in which the age of the victims was unknown; and four in which drowning occurred as a result of a car accident or crocodile attack.

Almost two-thirds (63.4%) of the children in these 339 cases analysed were boys. The proportions of these drownings by age group were: children aged 1–4 years, 51.9%; those aged less than 1 year, 20.4%; those aged 5–9 years, 15.9%; and those aged 10–14 years, 11.8%.

Supervision was identified as a contributing factor in almost three-quarters (71.7%) of all unintentional cases of child drowning, although the level of explicit identification of supervision varied across age groups (Box 2). Supervision was specifically identified as a factor in only 17.7% of cases, but detailed review of text reports identified supervision as a contributor in an additional 54.0% of unintentional drownings. Supervision was definitely not a factor in 8.5% of cases (Box 2).

Availability of documents and the extent of detail they contained varied considerably between, and sometimes within, jurisdictions, as did timeliness of coroners' case closure (Box 3). Cases from all jurisdictions except New South Wales had a police report attached. The proportion of cases with coroner's findings attached varied from 11.1% in Queensland to 100% in Tasmania and Victoria. Although fewer Queensland and NSW cases had coroners' findings attached (11.1% and 18.2%, respectively), the police reports from these states contained extensive detail enabling the degree of supervision to be determined in 87.8% of Queensland

## 2 Extent to which supervision was identified as a contributing factor in closed unintentional child drowning cases, July 2000\* to June 2009, categorised according to child age

	Age of child				All cases
	< 1 year	1–4 years	5–9 years	10–14 years	
Total cases	69	176	54	40	339
Contribution of supervision (% of cases)					
Unknown (no text documents attached to the case)	1.4%	3.4%	3.7%	0	9 (2.7%)
Inadequate details in text documents to determine whether supervision was a factor	13.0%	19.3%	18.5%	12.5%	58 (17.1%)
"Supervision" (or equivalent terms) not identified in text documents, but one of a number of contributing factors	23.2%	27.3%	24.1%	25.0%	87 (25.7%)
"Supervision" (or equivalent terms) not identified in text documents but clearly a key contributing factor <sup>†</sup>	39.1%	27.8%	24.1%	17.5%	96 (28.3%)
"Supervision" (or equivalent terms) identified as a factor in text documents <sup>‡</sup>	20.3%	17.6%	14.8%	17.5%	60 (17.7%)
"Supervision" not a contributing factor	3.0%	4.6%	14.8%	27.5%	29 (8.5%)

\* January 2001 for Queensland. † For supervision, or lack thereof, to be identified as "a key contributing factor", the reports had to specifically state that the caregiver left the child unattended in an aquatic setting. ‡ Police narratives and coroners findings. ◆

cases and 70.7% of NSW cases. For South Australian cases, 38.1% included coroners' findings, and limited detail within both police reports and findings meant that 71.4% of SA cases contained inadequate detail to determine the factors that contributed to the drowning.

Despite almost half of identified cases of drowning (160; 47.2%) having coroners' findings attached, only 24 of these (15%) also included coroners' recommendations. There were 71 individual recommendations, with a maximum of nine recommendations for a single case. Sixteen recommendations were specific to supervision, six of which related to reinforcement and clarification of supervision; five to media and awareness campaigns; four

related to signage; and one to restricting access to ponds.

### DISCUSSION

The existing literature on child drowning often cites a lapse in, or lack of, supervision as a contributing factor.<sup>3,5,6</sup> Our findings confirm that this is also the case in Australia, with supervision a contributor in almost three-quarters of unintentional child drownings (71.7%). Indeed, with deeper interrogation of coroners' findings, absent or inadequate supervision might be associated with as many as 88.8% of child drownings, because in 58 cases (17.1%), inadequate detail was provided in text documents to determine whether supervision was a contributing factor.

The robustness and accuracy of coronial information<sup>7-9</sup> enables coroners and medical examiners to play an important and growing role in public health<sup>18</sup> and injury prevention.<sup>7-9</sup> Retrospective case-series reviews can be used to improve understanding of the aetiology of child drownings.<sup>3-6</sup> As a source of data to underpin drowning prevention, NCIS documents provide important information of injury aetiology.<sup>8</sup> However, absence of detail or inadequate detail in documents limits the potential benefits to the wider community in terms of injury prevention. For some cases, NCIS documents were missing, or the quality of detail included was poor. The level of detail varied considerably between jurisdictions. For example, in NSW, coroner's findings are only produced if the matter goes

## 3 Availability of documents and time to coronial case closure for closed unintentional child drowning cases in Australian jurisdictions, July 2000\* to June 2009

State or territory	Total cases	Percentage of cases with documents available				Time to case closure <sup>†</sup>	
		Police report	Coroners' finding	Autopsy report	Toxicology report	Average days	No. of cases
Tasmania	10	100.0%	100.0%	80.0%	80.0%	— <sup>‡</sup>	0
Victoria	50	100.0%	100.0%	62.0%	66.0%	182	5
Western Australia	56	100.0%	96.4%	41.1%	83.9%	278	11
Northern Territory	7	100.0%	85.7%	85.7%	42.9%	398	3
Australian Capital Territory	6	100.0%	66.7%	66.7%	16.7%	— <sup>‡</sup>	0
New South Wales	99	70.7%	18.2%	52.5%	27.3%	304	26
South Australia	21	100.0%	38.1%	4.8% <sup>§</sup>	14.3% <sup>§</sup>	373	6
Queensland	90	100.0%	11.1%	0 <sup>§</sup>	0 <sup>§</sup>	366	24
Total	339	91.4%	47.2%	36.9%	36.0%		

\* January 2001 for Queensland. † Coroner closure data were collected from 2006, so case closure dates were only available for cases notified from 1 January 2007 to 30 June 2009. ‡ Tasmania and the ACT did not have any unintentional drowning deaths that match criteria (eg, from 1 January 2007 to 30 June 2009). § Autopsy and toxicology documents not available for Queensland and not routinely uploaded for SA. ◆

to inquest.<sup>15</sup> By contrast, in other states, coroners' findings are produced for all reported deaths. Likewise, police reports ranged in length from one line to two pages, with wide variation in detail between jurisdictions. Lack of detail within reports, or missing documents, restricts the ability to fully understand incident circumstances and assess the role of supervision in the drowning death. These factors limit the ability to target, design, implement and evaluate national child drowning prevention strategies.

There is also scope to improve the consistency of information within text documents relating to child drownings and supervision, so that more relevant cases can be identified when using keyword searches. When applying the classification scale (Box 1), a lack of supervision was associated with over two-thirds of child drownings. However, keyword-only searches identified supervision as a contributing factor in only 17.7% of cases, and it is extremely unlikely that poor keyword selection contributed to this finding. This indicates that, without detailed searching of all coronial reviews of unintentional drownings, the identification of supervision as a factor in child drownings would be significantly underreported. While the NCIS is continually being improved,<sup>14,19</sup> future researchers who rely on keyword searches should be aware of the potential for cases to be missed. Our study also identified an apparent lack of awareness among individuals responsible for reporting drowning deaths of what constitutes appropriate supervision of children around water and/or of the terminology and definitions of supervision reported in previous literature to describe this.<sup>16,17</sup> These limitations do not relate to the NCIS itself, but to the differences in breadth of information produced by investigators of deaths that the NCIS makes available.

The role of coroners' recommendations in improving public health and safety is relatively unexplored,<sup>20</sup> but recommendations can inform the development of injury prevention countermeasures.<sup>21</sup> Interestingly, our study identified few recommendations; this relatively limited inclusion of recommendations decreases the potential for coroners to act as a force for improved public health.<sup>20</sup> Accordingly, we highlight the need for coroners to include recommendations for prevention in as many findings as possible.

There is also a need for stakeholders or organisations affected by coroners' recommendations to be required to respond and implement changes.<sup>20</sup> Currently, it is only in the Northern Territory, Australian Capital Terri-

tory, Victoria and NSW that organisations are required to respond to coroners' recommendations.<sup>20</sup> Thus, recommendations relating to child drowning and supervision may not be considered or implemented, and this may be a reason why supervision continues to be identified as a contributing factor in child drownings.

Our study had methodological limitations. The most important of these is that we only considered closed cases. While time to closure varied, on average, it was nearly 10.5 months for unintentional drownings. Nonetheless, our relatively large sample size means it is unlikely that including open cases would have changed our findings.

In conclusion, the NCIS provides relevant information for consideration by stakeholders in the development of drowning interventions. As our findings illustrate, there is some ambiguity among coroners and others reporting drowning deaths about what constitutes supervision; thus, advocating clear and consistent definitions of supervision will enhance the value of the NCIS for drowning prevention. Explicit reference by coroners to the importance of supervision in preventing child drowning, along with increased media publicity about coroners' findings, may contribute to improved caregiver supervision of children in aquatic settings.

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## COMPETING INTERESTS

None identified.

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