



ORIGINAL ARTICLE

Causes of distraction leading to supervision lapses in cases of fatal drowning of children 0–4 years in Australia: A 15-year review

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Aim: Supervision is a strategy for preventing drowning among children. However, supervision lapses continue to be a contributory factor in child drowning. This study aims to identify, describe and analyse the causes of distraction leading to lapses in supervision in child drowning.

Methods: A total population survey of all fatal unintentional drownings among children aged 0–4 years between 1 July 2002 and 30 June 2017 was undertaken using data from the Australian National Coronial Information System. Among closed coronial cases, causes of distraction leading to lapses in supervision were collected as free text from closed case documentation and subsequently thematically grouped into categories. Univariate and χ^2 analysis was undertaken ($P < 0.01$).

Results: A total of 447 children drowned during the study period (62.0% male; 66.9% aged 1–2 years; 53.3% swimming pools; 79.4% falls into water). Of the 426 (95.3%) closed cases, common supervision lapses were due to indoor household duties (27.6%), outdoor household duties (12.6%) and talking/socialising (11.9%).

Conclusions: This study has identified common scenarios for distractions leading to supervision lapses including the link between indoor household duties and bathtub drowning deaths and talking/socialising for deaths in swimming pools and at rivers. Challenges include medical issues impacting sole carers. The 7% of cases where a supervision lapse occurred due to miscommunication are opportunities to further reinforce the need for a designated supervisor, particularly with two or more adults present. Study findings on distraction causes, and strategies to minimise them, should be incorporated into national public awareness campaigns aimed at parents and care givers of this at-risk group.

Key words: child; drowning; prevention; supervision; technology.

What is already known on this topic

- 1 Children 0–4 years are the age group at highest risk of drowning.
- 2 In almost all child drowning deaths, distractions leading to lapses in supervision are a contributory factor.
- 3 Active adult supervision is necessary to prevent children from drowning.

What this paper adds

- 1 Undertaking household duties, both indoor (28%) and outdoor (13%), followed by talking/socialising (12%) were common causes of distraction.
- 2 Miscommunication between supervisors contributed to 7% of child drowning deaths.
- 3 Common causes of distraction should be utilised to better target public awareness of the risk of lapses in supervision leading to drowning for parents and care givers of young children.

Supervision is necessary to prevent child drowning.^{1–4} Many drowning prevention and child safety advocates promote supervision as one component of a multi-faceted strategy to reduce a child's risk of drowning,^{5–7} which also includes restricting a child's access to water, water familiarisation and cardiopulmonary resuscitation training for care givers.

Children under 5 (0–4 years) are the age group at highest risk of unintentional drowning in most countries, regardless of

country income level.^{8–10} The World Health Organization estimates 66 000 children under the age of 5 drown annually,¹¹ with the majority of cases in high-income contexts likely to have been captured in these estimates.¹² This risk extends to non-fatal drowning with an estimated ratio of eight children under five hospitalised for every fatal drowning in Australia.¹³

Children under the age of 5 in high-income countries commonly drown in and around the home with private swimming pools posing the highest risk.⁹ Pool fencing is an effective strategy for restricting a child's access to water (and therefore their risk of drowning);¹⁴ however, this is often advocated as being a strategy that works best in conjunction with supervision.^{1,9}

'Supervision' is a ubiquitous term,¹⁵ and identifying a definition is challenging. Researchers have defined a process for measuring supervision as '...behaviours that index attention

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(watching and listening) in interaction with those that reflect a state of readiness to intervene (touching/within arm's reach/beyond arm's reach), with both types of behaviours judged over time to index continuity in attention and proximity (constant/intermittent/not at all) (Morrongiello 2005: 538).¹⁵ Similarly, adequate supervision comprises the critical dimensions of attention, proximity, continuity and preparedness.¹

Supervision is a key strategy for preventing child drowning. However, supervision can and does fail, contributing to drowning among this at-risk cohort. Little is known about the contributory factors leading to lapses in child supervision. To address such a knowledge gap, this study aims to identify, describe and analyse the causes of distraction leading to lapses in supervision (henceforth referred to as distractions from supervision) in cases of unintentional fatal child drowning in Australia, a high-income context.

Methods

All cases of unintentional fatal drowning among children aged 0–4 years in Australia were recorded from the Australian National Coronial Information System.¹⁶ In Australia, drowning is considered a 'sudden and unexpected death' in all eight states and territories and therefore requires mandatory reporting to, and investigation by, a coroner. This results in an extremely high capture of cases. Cases from the National Coronial Information System were supplemented with data from police reports, media¹⁷ and child death review teams. Data were consolidated into the Royal Life Saving Society – Australia National Fatal Drowning Database. The method for collating and coding fatal drowning data in Australia has been published previously.^{4,18} This method has been shown to capture up to ~40% more fatal unintentional drownings than using the International Classification of Diseases (ICD) codes for unintentional drowning (W65-74) only.¹²

Data on demographics and circumstances were collected and coded as per the definitions in the Royal Life Saving National Fatal Drowning Database Definitions and Coding Manual.¹⁹ Season of drowning incident was coded into Summer (December, January, February), Autumn (March, April, May), Winter (June, July, August) and Spring (September, October, November). Time of day of drowning incident was coded into early morning (12:01 am to 6 am), morning (6:01 am to 12 pm), afternoon (12:01 pm to 6:00 pm) and evening (6:01 pm to 12 am).¹⁹ A multiple fatality event was defined as such if more than one person drowned in the same incident. Residential status of drowning location was coded to child's own home, not own home, not residential (e.g. drowning occurred at the public pool, river, etc) or unknown. The swimming pool category includes in-ground private residential swimming pools, portable pools on private residential land and public swimming pools. The activity of 'bathing' refers to bathing or being bathed in a bath.

Information on distractions from supervision when the child drowned was collected as free text from coroner's reports, followed by police reports. Coroner's reports were favoured as being a more accurate source of information; however, in most instances coroner's reports either drew information required for this study directly from the police report, or the police report was used, due to there being no relevant information for this study in

the coroner's report. An inductive process²⁰ was used to code free text distractions. Where the parent or carer had two causes of distraction, the primary cause of distraction was coded as the first event that interrupted supervision, with the additional cause of distraction coded as secondary.

Where more than one person was providing supervision, the primary carer was identified as the person within the closest proximity to the child. If this was not known, then the primary carer was identified as the last person to have contact with the child. If this was also unknown, preference was given to coding an immediate family member as the primary carer. If both parents were supervising (but proximity and last known contact variables were unknown), the primary supervisor coded as parent supervisor – unclear.

Where two parents/carers were providing supervision, the primary carer's distraction from supervision was coded as the primary cause of distraction. Where not immediately evident what the primary cause of distraction was or who the primary carer was, this was coded using a consensus-based approach between authors.²¹

Fourteen cases were removed from the dataset prior to analysis as a distraction from supervision did not occur in the chain of the events that led to the drowning. These included cases of flash flooding ($n = 3$), boat capsizes ($n = 4$) and car-related incidents ($n = 5$). Data are correct as at 14 April 2019. At this date, 426 (95.3%) cases were closed and no longer under coronial investigation. Only closed cases were used to examine distractions from supervision, as circumstances of the incident and information on supervision distractions is unavailable for cases still under coronial investigation. Chi-square analysis was undertaken to ensure no differences between the closed and open cases. Due to small numbers, the aquatic location categories of beach and ocean/harbour were coded into 'other' locations.

Analysis was conducted in SPSS V20 (Armonk, NY, USA). Data analysis is reported using frequencies and χ^2 analysis with a 95% confidence interval. A modified Bonferroni²² was used, deeming statistical significance $P < 0.01$.

Ethical approval for this study was granted by the Victorian Department of Justice Human Research Ethics Committee (JHREC) (CF/07/13729; CF/10/25057, CF/13/19798).

Results

A total of 447 children aged 0–4 years drowned during the study period. Fourteen cases were removed as a distraction from supervision did not occur in the chain of events leading to the drowning. Of the remaining 433 cases, 7 cases still under coronial investigation were removed, leaving 426 cases for analysis (Fig. 1).

Demographics and circumstances

Swimming pools were the leading location for drowning (53.5%), of which private residential swimming pools were the most common (86.6% of all swimming pool drownings in this study). Sixty-two percent of all drowning deaths were males. Sixty-seven percent (66.9%) of fatal drownings occurred in toddlers aged 1–2 years. Children <12 months of age were significantly more likely to drown in non-swimming pool locations

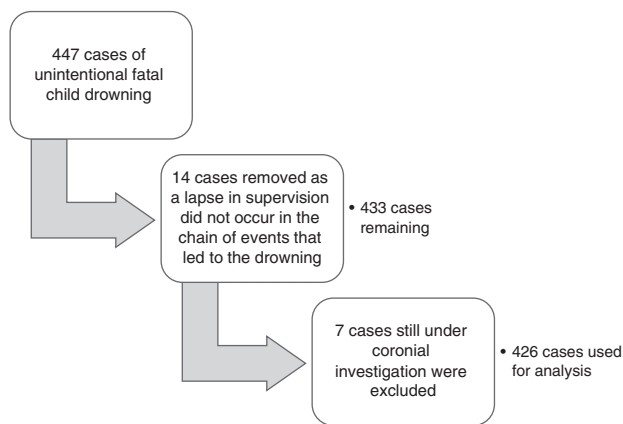


Fig. 1 Flow chart depicting cases for analysis.

($\chi^2 = 52.4$; $P < 0.001$), most commonly bathtubs (76.5%). A fall into water was the leading activity prior to drowning (79.4%). Drowning occurs in all season, albeit with significant variation,

from 40.0% of all incidents occurring in summer to 13.6% of incidents occurring in winter. Child drowning mostly occurs in the daylight hours, with over half (51.7%) occurring in the afternoon hours. Over two-thirds occurred in the child’s own home (68.5%). In six instances, distractions from supervision led to a multiple fatality event, where two children drowned in the one incident, totalling 12 fatalities (Table 1).

Distractions from supervision

Categories of distractions from supervision for both primary and secondary carers included indoor household duties ($n = 153$; 27.6%), outdoor household duties ($n = 70$; 12.6%) and talking/socialising ($n = 66$; 11.9%). In 38 cases (6.8%) miscommunication occurred, where each supervisor mistakenly thought the other was supervising. In a further 61 instances (11.0%) the distraction was not recorded (Table 2).

Over half ($n = 243$; 57.0%) of cases had one supervisor, in 116 (27.2%) cases there were two supervisors and in 23 cases (5.4%) three or more supervisors were present. Indoor and outdoor household duties were the leading and second-leading

Table 1 Demographic and circumstances of unintentional fatal drowning among children aged 0–4 years, Australia, 2002/2003 to 2016/2017 ($n = 447$)

	Total, <i>n</i> (%)	Swimming pools, <i>n</i> (%)	Non-swimming pools, <i>n</i> (%)	χ^2 comparing swimming pools with non-swimming pools (<i>P</i> value)
Total	447 (100.0)	239 (53.5)	208 (46.5)	—
Sex				
Male	277 (62.0)	142 (59.4)	135 (64.9)	1.422 (0.233)
Female	170 (38.0)	97 (40.6)	73 (35.1)	
Age, years				
0	51 (11.4)	3 (1.3)	48 (23.1)	52.394 (<0.001)
1	189 (42.3)	108 (45.2)	81 (38.9)	1.778 (0.182)
2	110 (24.6)	77 (32.2)	33 (15.9)	16.029 (<0.001)
3	61 (13.6)	31 (13.0)	30 (14.4)	0.199 (0.655)
4	36 (8.1)	20 (8.4)	16 (7.7)	0.069 (0.793)
Activity				
Bathing	72 (16.1)	1 (0.4)	71 (34.1)	94.662 (<0.001)
Falls	355 (79.4)	228 (95.4)	127 (61.1)	80.802 (<0.001)
Swimming and recreating	15 (3.4)	9 (3.8)	6 (2.9)	0.747 (0.688)
Other	2 (0.4)	0 (0.0)	2 (1.0)	2.812 (0.245)
Unknown	3 (0.7)	1 (0.4)	2 (1.0)	—
Season of drowning incident				
Summer	179 (40.0)	107 (44.8)	72 (34.6)	4.776 (0.029)
Autumn	79 (17.7)	40 (16.7)	39 (18.8)	0.310 (0.578)
Winter	61 (13.6)	21 (8.8)	40 (19.2)	10.294 (0.001)
Spring	128 (28.6)	71 (29.7)	57 (27.4)	0.289 (0.591)
Time of day of drowning incident				
Morning	124 (27.7)	57 (23.8)	67 (32.2)	6.189 (0.103)
Afternoon	231 (51.7)	128 (53.6)	103 (49.5)	
Evening	61 (13.6)	34 (14.2)	27 (13.0)	
Early morning	7 (1.6)	6 (2.5)	1 (0.5)	
Unknown	24 (5.4)	14 (5.9)	10 (4.8)	—
Residential status of drowning incident				
Own home	306 (68.5)	164 (68.6)	142 (68.3)	0.016 (0.899)
Not own home	83 (18.6)	65 (27.2)	18 (8.7)	25.501 (<0.001)
Not residential	53 (11.9)	7 (2.9)	46 (22.1)	39.081 (<0.001)
Unknown	5 (1.1)	3 (1.3)	2 (1.0)	—

Table 2 Categories of distraction from supervision for primary and secondary carer and examples of distraction type for closed cases ($n = 555$)

Distraction categories	Total, n	Distraction types/examples
Indoor household duties	153	Includes putting on washing, washing up, cooking dinner, checking on dinner, putting clothes in dryer, tidying up, collecting pyjamas or forgotten items and bringing them to the bathroom, using the toilet/showering, etc
Outdoor household duties	70	Includes hanging washing outside, gardening, taking garbage out, outdoor household repairs, etc
Talking/Socialising	66	Can occur inside or outside the house. Relates to talking/socialising in person. Talking to someone on the phone was coded into electronic distractions
Electronic distractions	51	Includes using the computer, using the phone and indoor recreation activities such as watching movies, watching TV or playing computer games, etc
Childcare	49	Taking care of children being their own children or unrelated children
Fell asleep/Sleeping	43	Includes where carers fell asleep or were still sleeping from the night before when child drowned
Miscommunication	38	Where each supervisor mistakenly thought the other was supervising
Outdoor recreation	17	Includes picnics, swimming, preparing boats, packing up cars after a day out
Medical issues	7	Includes seizures, migraines, sedative effects of medications
Unknown	61	Cases where no information was provided on the circumstances leading to the drowning. For example, the case files focused on treatment and post-immersion events, rather than circumstances leading up to the drowning
Total	555	—

Multiple distractions may have been identified for both primary and secondary supervisor, thus the total number of distractions is more than the total number of children who drowned.

distraction from supervision for cases of child drowning with one or two supervisors present. For cases with three or more supervisors present, the leading cause of distraction was talking/socialising ($n = 11$; 47.8%), followed by childcare ($n = 4$; 17.4%) (Fig. 2).

In all instances ($n = 7$), where the supervisor's medical issues led to a distraction from supervision, only one supervisor was present. When examining the relationship of the primary

supervisor to the child, a parent, either mother (48.5%) or father (23.6%) were the most common, with the primary parent responsible for supervision being unclear in 14.0% of cases. In 6.6% of cases, a grandparent was the primary supervisor. In 39.5% of cases, the child who drowned was in the company of a child or other children. When the drowned child was left with another child/children, the common distractions from supervision were indoor household duties (30.8%), followed by childcare (17.5%) and talking/socialising (16.1%). Indoor household duties were the most common distraction from supervision in the case of drowning in the child's own home (40.2%), whereas talking/socialising was the leading distraction for drowning in a residential location that was not the child's own home. Childcare was the leading cause of distraction in child drowning incidents at non-residential locations (23.8%) (Table 3).

When examining distractions from supervision by location of drowning incident, indoor household duties were significantly more likely to lead to fatal drowning of children in bathtubs/spa baths ($\chi^2 = 36.0$; $P < 0.001$). Outdoor household duties were significantly more likely to lead to drowning in lakes/dams/lagoons ($\chi^2 = 24.7$; $P = 0.002$), while talking/socialising was more likely to lead to child drowning in river/creek/stream locations ($\chi^2 = 26.9$; $P = 0.001$) and swimming pools ($\chi^2 = 20.4$; $P = 0.009$) (Table 4).

Outdoor household duties were more likely to be associated with fatal drowning among boys ($\chi^2 = 10.2$; $P = 0.001$). No trends in distraction type by age were found. For time of day, the only statistically significant distraction was sleeping in the early morning hours ($\chi^2 = 45.168$; $P < 0.001$). No difference was seen by season.

Discussion

Children under 5 are the age group at highest risk of drowning^{13,23} and in just 14 cases (3%) a supervision lapse was not a contributory factor. Indoor and outdoor household duties, followed by talking/socialising were found to be the leading distractions from supervision. Overall, distractions did not differ by age, gender, season or time of day except for males being more likely to drown when a supervisor was distracted by outdoor activities and for child drowning when supervisors were sleeping in the early morning hours. Such findings are key to developing public awareness tools and informing the direction of future research.

For bathtub drowning deaths, 50% of the distractions were due to the carer undertaking indoor household duties. Bathtub drowning deaths predominately occur in children under 1, in as little as five centimetres of water and within 2 min,²⁴ highlighting the importance of continual, proximate supervision. Ongoing advocacy and public awareness of the dangers of leaving small children unsupervised in the bath, even in the company of siblings or in bath seats, must continue. In particular, messaging should focus on the importance of having everything ready for bathing and encouraging parents to ignore the temptation to undertake other household duties while young children are bathing.

The study finding that boys more commonly drowned when the supervisor was undertaking outdoor household duties was unexpected. It has been suggested that supervisory behaviours

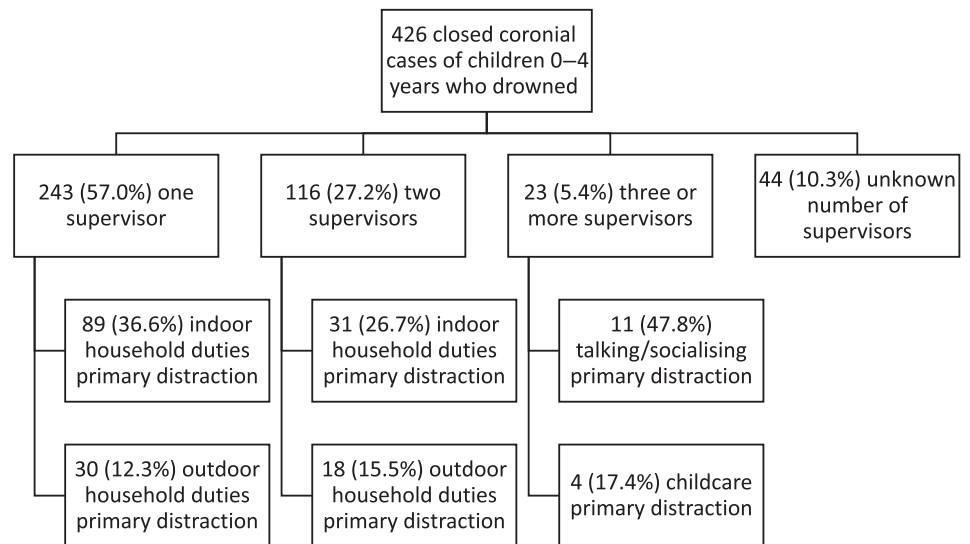


Fig. 2 Flowchart depicting number of supervisors and primary distractions among closed cases (n = 426).

are reliant upon the social context within which they are enacted (including the gender of the child).²⁵ This finding requires further research to better understand the social and environmental context within which this bias in supervisory distraction leading to child drowning among boys is occurring.

In 44 (10.3%) cases of child drowning, the primary supervisor was talking or socialising when the fatal drowning incident occurred. Such cases most commonly involved one supervisor (45.5%), talking to another person who was not supervising, at swimming pool and river/creek/stream locations, where the

Table 3 Category of primary distraction from supervision by number of supervisors, type of primary distraction for closed cases (n = 365)

	Indoor household duties, n	Outdoor household duties, n	Talking/Socialising, n	Childcare, n	Electronic distractions, n	Fell asleep/Sleeping, n	Miscommunication, n	Outdoor recreation, n	Medical issues, n	Total, n
Total	122	50	44	41	37	34	19	11	7	365
Number of supervisors										
1	89	30	20	28	27	25	0	7	7	233
2	31	18	13	9	10	9	16	3	0	109
3 or more	2	2	11	4	0	0	3	1	0	23
Relationship of primary supervisor to child										
Mother	74	17	16	25	18	20	1	0	6	177
Father	21	20	13	4	8	7	4	8	1	86
Parent supervisor – Unclear	10	7	12	2	3	5	9	3	0	51
Grandparent	11	3	1	1	5	0	3	0	0	24
Sibling	0	0	0	2	1	0	1	0	0	4
Extended family member	1	1	1	3	2	0	1	0	0	9
Unrelated adult	5	2	1	4	0	2	0	0	0	14
Child left with another child/children										
Yes	44	15	23	25	14	7	5	6	4	143
No	77	35	20	16	22	27	14	5	3	219
Unknown	1	0	1	0	1	0	0	0	0	3
Residential location of drowning incident										
Own home – Yes	102	36	18	21	31	26	12	2	6	254
Own home – No	15	11	17	10	5	5	3	0	0	66
Not residential	4	3	9	10	1	2	4	9	0	42
Unknown	1	0	0	0	0	1	0	0	1	3

This table includes only closed coronial cases and supervision lapses by the primary supervisor only. It excludes those closed cases where the cause of the distraction from supervision was unknown.

Table 4 Categories of primary distraction from supervision by categories of aquatic location of drowning incident for primary supervisor and closed cases only (*n* = 365)

	Indoor		Outdoor			Fell asleep/ Sleeping		Outdoor	Medical	Total	χ^2 (P value)
	household duties	Talking/ Socialising	household duties	Electronic distractions	Childcare	Miscommunication	recreation	issues			
Bath tub/Spa bath	31	3	4	9	4	6	0	0	5	62	36.024 (<0.001)
Lake/Dam/Lagoon	11	2	14	3	3	1	2	3	0	39	24.692 (0.002)
River/Creek/Stream	3	8	3	1	4	3	2	4	0	28	26.930 (0.001)
Swimming pool	56	26	22	21	27	23	10	1	2	188	20.416 (0.009)
Other	21	5	7	3	3	1	5	3	0	48	12.930 (0.114)
Total	122	44	50	37	41	34	19	11	7	365	—

This table includes only closed coronial cases and supervision lapses by the primary supervisor only. It excludes those closed cases where the cause of the distraction from supervision was unknown.

drowned child was with another child/children (52.3%). Such cases highlight the importance of the ‘attention’ component of supervisory behaviour.¹⁵

There were 19 cases of child drowning in this study which occurred due to miscommunication among supervisors. Where two supervisors were present, 15% of drownings were due to miscommunication. Where three or more were present, 13% were due to miscommunication. Cases of drowning due to miscommunication among supervisors most commonly occurred in swimming pools (52.6%). Such tragic cases, highlight the importance of having a designated child supervisor, who passes that responsibility to another person, should they no longer be actively supervising. A tool such as a designated child supervisor hat⁵ can act as a visual cue of this responsibility. It is vital that the role of a designated supervisor be undertaken by a competent adult, who is not under the influence of alcohol or drugs. It may be worth exploring the triggering of public awareness messages about such supervision lapses in the lead up to the warmer months and the festive season in Australia (November to February).

This study has identified challenges for drowning prevention practitioners and advocates. One such challenge is the issue of a distraction from supervision caused by the supervisor’s medical issues. Such occurred in seven cases of child drowning. In all cases, the person who fell ill was the only person supervising. Strategies for providing support to single parents or those who are the sole supervisor and fall ill should be explored further. Supervising adults with epilepsy should avoid bathing with their child in case of a seizure. In 143 cases, the child who drowned was left with another child. The dangers of relying on children to provide supervision for other children must also be highlighted, and support provided for single parents who may feel they have no other choice.

In advocating for improved supervision, common distractions drawn from actual cases of child drowning should be utilised, combined with strategies to combat distractions. These may include family support options. Increased education of parents and care givers of young children, on the speed and silence of child drowning and risk of leaving children unsupervised around water, even if only for ‘moments’, is required. Although electronic distractions accounted for 10% of supervision lapses in cases of child

drowning, further research is required to explore the impact of technology on child supervision around water. Similarly, should data be available, it may be worth conducting a similar study on cases of non-fatal drowning to see if there are differences in the causes of distraction, leading to supervision lapses.

This study reflects findings from a high-income country and therefore findings related to distractions from supervision in cases of child drowning in low- and middle-income countries are likely to differ. Further studies in low- and middle-income countries contexts on this important drowning prevention topic are encouraged. Similarly, although beyond the scope of this study, it may be worthwhile to explore the impact (if any) of parent and care giver public education and awareness campaigns around adult supervision as a child drowning prevention strategy that was conducted during the time period of this study.

Strengths and limitations

This is a total population survey of all unintentional drowning deaths among children under 5 in Australia. Only closed cases (*n* = 426; 95.3% of all unintentional fatal child drownings during the study period) were used for the analysis of supervision lapses to provide more complete information. While only closed cases were used, the authors believe these are representative of the overall cases as no differences were found between open and closed cases for demographic, incident and state or territory variables. Limitations within this study include: in some instances (*n* = 44; 10.3%) even where a case was closed, case documentation was either missing or the distraction from supervision was not recorded in the attached documentation. The consensus-based approach used by authors may result in different coding and therefore analysis if different authors undertook the study.

Conclusions

Distractions from supervision in cases of unintentional fatal child drowning included indoor and outdoor household activities, talking/socialising and miscommunication. This study provides the evidence base on which policy, advocacy and public education efforts can be based. For children 0–1 years, continuous,

proximate supervision of bathing is recommended. For all children, non-distracted supervision near water is vital. It is hoped that such public health advocacy will continue efforts to reduce drowning deaths of young children.

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