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Boating and watercraft-related injury in Australia

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Boating and watercraft-related activities are popular in Australia given our easy access to beaches and waterways (Pidgeon & Mahony 2016). Many watercraft-based activities involve recreational water sports such as boating, towed water sports (e.g. water skiing), use of personal watercraft (e.g. kayaking and jet skiing) as well as surfing and boogie boarding.

The Australian Water Safety Strategy 2016–20 has a focus on drowning prevention and a commitment to achieving the goal of reducing drowning by 50% by 2020 (Australian Water Safety Council 2016). One of the strategy's priority areas is reducing boating, watercraft and recreational activity related drownings.

However, drowning is just 1 outcome that can result from a boating or watercraft accident. Few Australian studies are available looking at non-drowning injuries associated with recreational watercraft activities and sports (Pikora et al. 2011).

In 2016–17, almost 60,000 people were hospitalised for sports injuries in Australia (AIHW: Kreisfeld & Harrison 2020) and among those cases were examples of water sports related injury. In 2016–17, the highest rates of water-related sporting injury for people aged 15 and over were for water skiing (369 cases for every 100,000 participants); surfing (175 per 100,000); fishing (160 per 100,000) and boating sports (69 per 100,000). The types of injuries associated with water sports range from fractures to soft-tissue injuries and cuts.

There are more types of watercraft activities and sports than the 4 types reported in *Hospitalised sports injury in Australia, 2016–17* (AIHW: Kreisfeld & Harrison 2020) and this report takes a broader look at many of them.

This report examines injury hospitalisations in Australia which occurred as a result of a boating or watercraft-related injury in 2017–18. It does not include information on people who sought treatment at hospital emergency departments; general practitioner clinics; sports medicine centres; or from allied health practitioners such as physiotherapists.

Key points

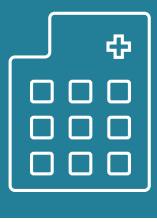
In 2017–18, **2,670 people were hospitalised** for a watercraft injury. Males were twice as likely to have a watercraft-related injury compared with females.

For injury cases based on **external cause**:

- **43%** were caused by an accident on board a **watercraft**.
- **Passenger ships** and **fishing vessels** were common types of boats identified with watercraft injury.
- **Almost half suffered a fracture** due to a watercraft injury.
- **81 people** were working for income at the time of injury.

For injury cases based on **activity**:

- **Almost half (49%)** of all cases were caused by **surfing** and **boogie boarding**.
- For **water skiers**, almost half **(43%)** the injuries were caused by knee or wake boarding.



AIHW

How are hospitalised watercraft-related injuries identified?

Watercraft-related injuries can be identified in hospital data in 2 ways. The first uses information from the external cause codes and the second from activity at the time of injury codes. External cause codes are used to describe the environmental event, circumstance or condition that caused the injury.

What types of watercraft-related injuries are included?

Watercraft-related injuries have been identified in hospital records using 2 types of codes: external cause of injury codes and activity at the time of injury codes.

External cause of injury codes include Water transport accidents codes and a Falls code:

V90	Accident to watercraft causing drowning and submersion
V91	Accident to watercraft causing other injury
V92	Water-transport-related drowning and submersion without accident to watercraft
V93	Accident on board watercraft without accident to watercraft, not causing drowning and submersion
V94	Other and unspecified water transport accidents
W02.2	Fall involving water ski

Activity at time of injury codes include:

U53	Boating sports (which includes Canoeing, Jet skiing, Kayaking, Power boat racing, Rowing and sculling, Surf boating, Yachting and sailing, Surf skiing, Other specified boating sport, and Unspecified boating sport)
U54.4	Surfing and boogie boarding
U54.6	Water skiing
U54.7	Wind surfing
U64.4	River rafting
U64.5	White-water rafting

There are 2 external cause categories that directly identify watercraft-related injuries: a range of codes from the transport accident section (V90–V94) that includes watercraft accidents in the course of recreational activities, and the falls code W02.2 *Fall involving water ski*. These codes can be the first or primary cause of the injury (first external cause) or be found in any of the additional external cause code fields (up to 31 fields).

In addition, there are a range of activity codes that identify individual (e.g. kayaking) and team or group watercraft-based activities (e.g. sailing). As with the external cause codes, a watercraft-based activity code can appear anywhere in the record (up to 31 fields). Not all injury hospital records contain an activity code and, if they do, many are unspecified.

Some hospital records will have only 1 watercraft-related injury external cause code as the first or primary cause, while other records will have 1 or more and a non-watercraft-related external cause code as the primary cause. This is also the case for activity codes.

In this report watercraft-related injury cases were selected and analysed in 3 ways:

1. All cases with a watercraft-related external cause code anywhere in the record and cases with a watercraft-related activity code anywhere in the record
2. Only cases with a watercraft-related external cause code as the first or primary cause of injury
3. Only cases with a watercraft-related activity code as the first or primary activity at time of injury.

The second set of cases allows us to examine various aspects of the watercraft-related injury such as the nature of the injury and the body part injured due to the way the first or primary external cause codes are linked to the principal diagnosis in the record. By examining cases by the first or primary activity code (the third set of cases) we can gain insight into types of external causes other than those specified above.

Additionally, the standard injury case selection method was expanded to capture additional cases identified through the presence of a drowning code or 1 of a small number of diagnosis codes outside the injury and poisoning chapter of the ICD-10-AM (see **What data did we use?**).

All watercraft-related injuries

This section looks at all watercraft-related hospitalised injuries. Table 1 provides a summary of the different types of cases included in the report. As a case can have an external cause code and/or an activity code anywhere in the record, the groups in Table 1 are not mutually exclusive. For example, an included case may have an external cause of V90.4 *Accident to watercraft causing drowning and submersion – sailboat* and an activity code of U53.6 *Yachting and sailing* and would be counted in both case types A and B in the table below.

There were 2,670 incidences of hospitalised watercraft-related injury in 2017–18 with a watercraft-related external cause code anywhere in the record or a watercraft-related activity code anywhere in the record. In each of the case types there were many more males than females.

There were more cases with a watercraft-related activity code in the record than a transport-related code suggesting many of the cases had a cause of injury that fell outside the specific external cause codes identifying a watercraft-related incident used in this report. The small number of water-ski-related falls is more likely to reflect the use of other water-skiing external cause and activity codes rather than a small number of water-ski-related incidences.

Table 1: Summary table of watercraft-related injury cases, by sex, 2017–18

Case type	Case description	Males	Females	Persons
	All cases of watercraft-related injury	**2,004**	**666**	**2,670**
	All cases with a watercraft-related external cause code anywhere in the record and cases with a watercraft-related activity code anywhere in the record			
A	Only cases with at least 1 watercraft transport-related external cause code anywhere in record	840	351	1,191
B	Only cases with at least 1 watercraft activity-related code anywhere in the record	1,490	408	1,898
C	Only cases with at least 1 fall involving a water ski code anywhere in the record	94	35	129

Source: AIHW National Hospital Morbidity Database.

External cause watercraft-related injury cases

This section looks at hospitalised injury cases with a watercraft-related external cause code as the first or primary cause of injury (1,285 cases). Of the 1,191 records with at least 1 transport-related external cause code, 1,162 had a first or primary cause of injury code; and of the 129 records with a fall involving a water ski code anywhere in the record, 123 had a first or primary cause of injury code. As shown in Table 2, males had more than twice as many watercraft-related injuries compared with females. The middle age groups, 25–44 and 45–64 years, had the highest proportion of injuries for both males and all persons, while females had a much higher proportion of watercraft-related injuries among those aged 45–64.

Table 2: Number of external cause watercraft-related injury cases, by age and sex, 2017–18

	Males		Females		Persons	
Age group	Number	%	Number	%	Number	%
0–14	44	4.8	24	6.4	68	5.3
15–24	141	15.5	74	19.8	215	16.7
25–44	303	33.2	74	19.8	377	29.3
45–64	269	29.5	128	34.3	397	30.9
65+	155	17.0	73	19.6	228	17.7
Total	**912**	**100**	**373**	**100**	**1,285**	**100**

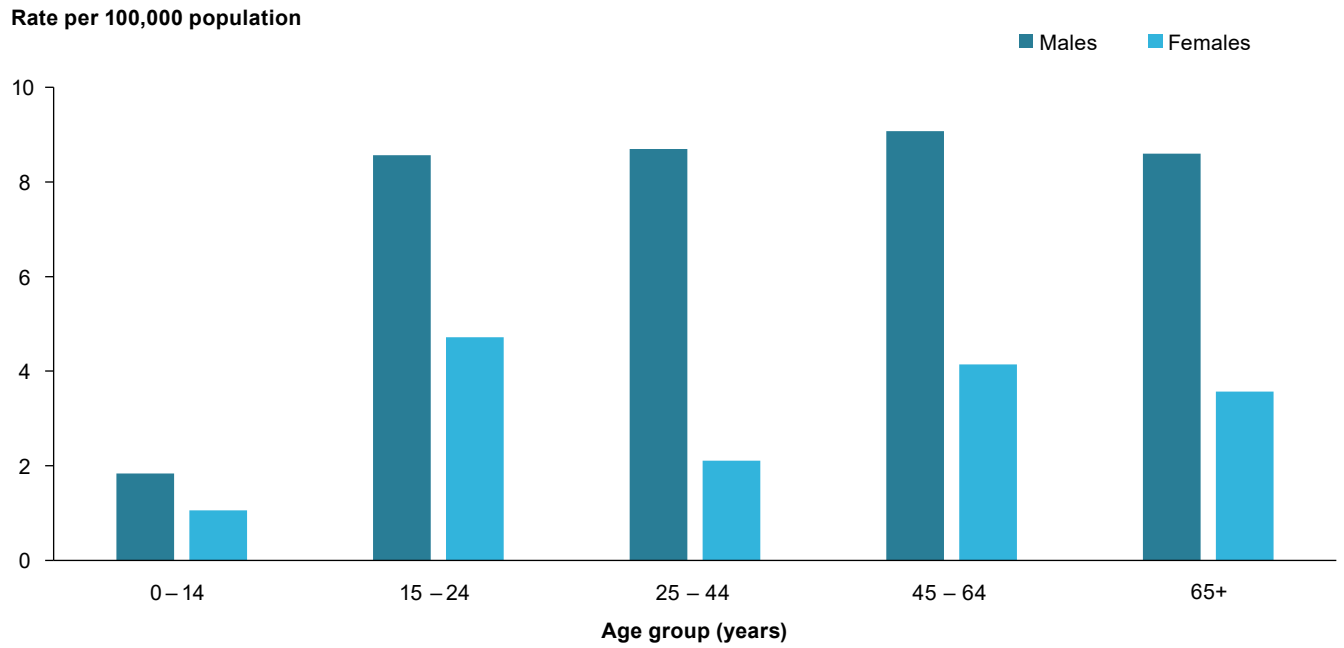
Notes

1. Cases include those with a first or primary watercraft-related external cause code in the range V90–V94 or W02.2.
2. Percentages may not total to 100 due to rounding.
3. Data underpinning this table can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

The rate of hospitalised cases with an external cause watercraft-related injury was much higher in each age category for males compared with females (Figure 1). The rate of injury in males did not vary much in age beyond 0–14 (about 9 cases per 100,000 population for each of the 4 older age groups). For females, the highest rate occurred in the 15–24 age group (about 5 cases per 100,000 population).

Figure 1: Age-specific rates of all external cause watercraft-related injury cases, by age and sex, 2017–18



Note: Data underpinning this figure can be found in the accompanying supplementary spreadsheets.
Source: AIHW National Hospital Morbidity Database.

Participation versus population rates

This report only provides rates of injury based on the total population. Population-based rates enable comparisons between parts of the Australian population that differ in size, such as age groups by sex. However, since most people in the population do not participate in each, or any, type of water sports, population-based injury rates do not provide a good indication of the risk of hospitalisation for participants, unlike rates based on numbers of participants. Some information on the participation rates of a small number of water-related sporting activities can be found in the report *Hospitalised sports injury in Australia, 2016–17* (AIHW: Kreisfeld & Harrison 2020).

What caused the injury?

As the inclusion criteria for these cases is based on whether a transport accident code or a specific fall code was present, information on other external causes (e.g. struck by objects, thermal injuries) is not available. Additional information on other causes of watercraft-related injuries will be presented in the section looking at cases selected on the basis of watercraft-related activity code as the first or primary activity at time of injury.

In 2017–18, of the 1,285 hospitalised injury cases with a first or primary watercraft-related external cause code, 1,162 were transport-related and 123 were due to W02.2 *Fall involving water ski* (Table 3). More males (912 cases) than females (373 cases) were hospitalised as a result. The largest proportion of cases (43%) were due to V93 *Accident on board watercraft without accident to watercraft, not causing drowning and submersion*, this includes accidental poisoning by gases or fumes, being crushed by a falling object, falls from 1 level to another or falls on stairs or ladders, among other things.

Table 3: Number of external cause watercraft-related injury cases, by external cause and sex, 2017–18

	Males		Females		Persons	
External cause	**Number**	**%**	**Number**	**%**	**Number**	**%**
Accident to watercraft causing drowning and submersion	13	1.4	10	2.7	23	1.8
Accident to watercraft causing other injury	100	11.0	25	6.7	125	9.7
Water-transport-related drowning and submersion without accident to watercraft	101	11.1	36	9.7	137	10.7
Accident on board watercraft without accident to watercraft, not causing drowning and submersion	380	41.7	178	47.7	558	43.4
Other and unspecified water transport accidents	228	25.0	91	24.4	319	24.8
Fall involving water skis	90	9.9	33	8.8	123	9.6
Total	**912**	**100**	**373**	**100**	**1,285**	**100**

Notes:

1. Includes those cases with a first or primary watercraft-related external cause code in the range V90-94 or W02.2.
2. Percentages may not total to 100 due to rounding
3. Data underpinning this table can be found in the accompanying supplementary spreadsheets.

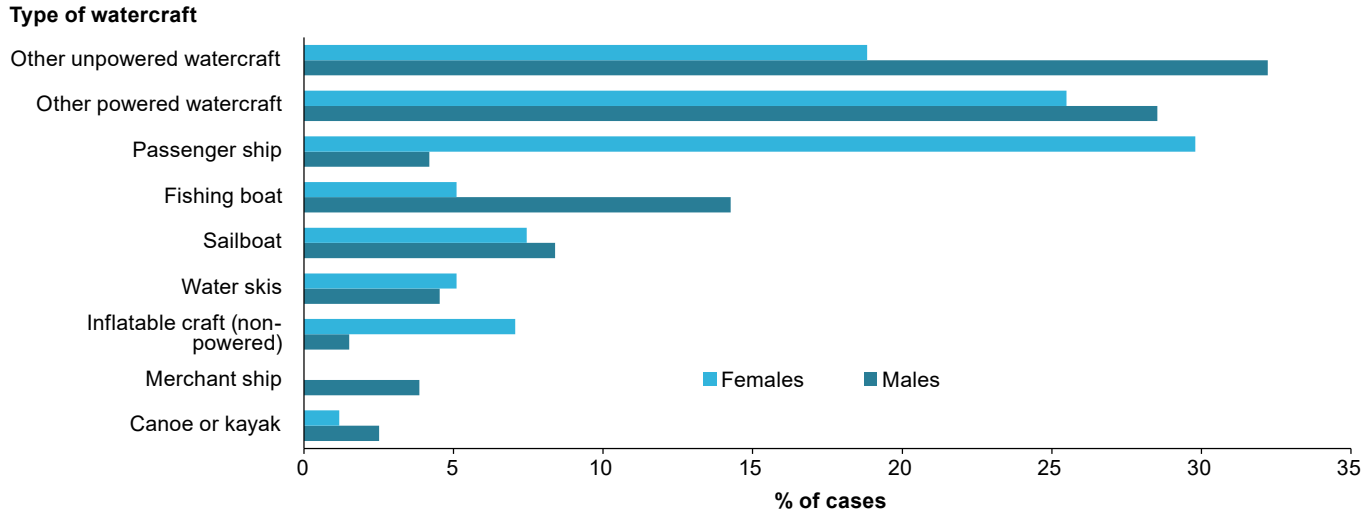
Source: AIHW National Hospital Morbidity Database.

What types of watercraft are associated with transport watercraft-related injury?

The types of watercraft associated with transport watercraft-related injury are shown in Figure 2. Figure 2 excludes 311 cases where type of watercraft was unspecified, the majority of which were attributed to males (226 cases). Overall, passenger ships (101 cases, 12%) and fishing boats (98 cases, 12%) were the main types of watercraft associated with hospitalised injury by external cause in 2017–18.

Injuries on fishing boats accounted for the largest proportion of cases of all watercraft types for males (85 cases, 14%). For females, the largest proportion of injuries occurred on passenger ships (76 cases, 30%).

Figure 2: Percentage of external cause watercraft-related injury cases, by type of watercraft and sex, 2017–18



Notes:

1. Includes those cases with a first or primary watercraft-related external cause code in the range V90–V94.
2. Data underpinning this figure can be found in the accompanying supplementary spreadsheets

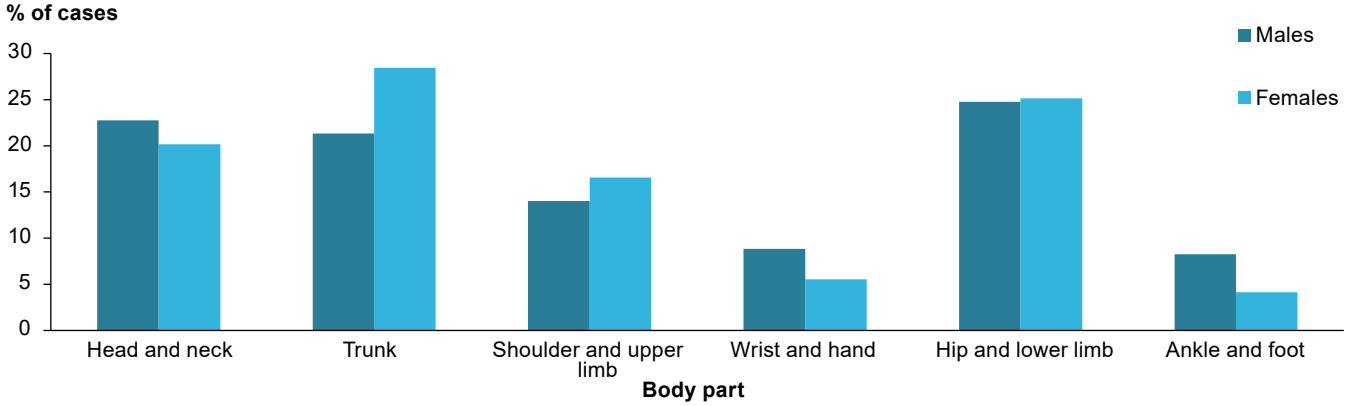
Source: AIHW National Hospital Morbidity Database.

An examination of 2 of the most common watercraft types, fishing boats and passenger ships, by age and sex shows that two-thirds of injuries on fishing boats were more likely to occur in the 2 oldest age brackets for men (57 cases, 67% for over 45+ years). Injuries on passenger ships occurred more frequently in the oldest age group for females (43 cases, 57% for over 65+ years); this is probably reflective of the age of passengers on cruise ship holidays.

What part of the body was injured?

Among the 1,285 cases of watercraft-related injury, 75 consisted of injuries to multiple or incompletely specified regions or were otherwise missing. Of the remaining cases, the main body regions injured were the hip and lower limbs (301 cases, 25%), trunk (284 cases, 23%) and the head and neck (266 cases, 22%). Figure 3 shows the distribution of body parts injured for males and females. The patterns of injury were fairly similar overall, but females had more injuries to their trunks (103 cases, 29%) followed by the hip and lower limbs (91 cases, 25%). For males, the largest proportion of injuries occurred to the hip and lower limbs (210 cases, 25%) followed by the head and neck (193 cases, 23%).

Figure 3: Body part injured for external cause watercraft-related injury cases, by sex, 2017–18



Notes:

1. Includes those cases with a first or primary watercraft-related external cause code in the range V90–V94.
2. Data underpinning this figure can be found in the accompanying supplementary spreadsheets

Source: AIHW National Hospital Morbidity Database.

Different parts of the body were injured according to the type of watercraft involved:

- The highest proportion of injuries were to the hip and lower limbs on passenger ships (36 cases, 37%)
- The trunk was the most frequently injured body part on fishing boats (20 cases, 24%) and other powered watercraft (77 cases, 35%)
- On other unpowered watercraft, the highest proportion of injuries were to the head and neck (87 cases, 38%)
- Among water skiers, 35% (43 cases) of injuries were to the hip and lower limb.

What type of injuries did people experience?

Fractures were the most common type of injury sustained as a result of a first or primary external cause watercraft-related injury (Table 4), followed by open wounds. The pattern of injury was similar for males and females but there were differences. Females had a higher proportion of fractures compared with males while males had a higher proportion of open wounds and soft-tissue injuries.

Table 4: Nature of injury for external cause watercraft-related injury cases, by sex, 2017–18

	Males		Females		Persons	
Nature of injury	**Number**	**%**	**Number**	**%**	**Number**	**%**
Fracture	339	45.0	187	50.3	586	46.5
Open wound	141	15.9	28	7.5	169	13.4
Soft-tissue injury	91	10.3	29	7.8	120	9.5
Superficial injury	31	3.5	17	4.6	48	3.8
Intracranial injury	29	3.3	17	4.6	46	3.7
Dislocation	35	3.9	8	2.2	43	3.4
Internal organ or vessel of trunk	26	2.9	10	2.7	36	2.9
Other injuries and Other specified	87	9.8	45	12.1	132	10.5
Unspecified	48	5.4	31	8.3	79	6.3
Total	**887**	**100**	**372**	**100**	**1,259**	**100**

Notes:

1. Includes those cases with a first or primary watercraft-related external cause code in the range V90-94 or W02.2.
2. Other injuries includes a small number of burns and poisoning cases.
3. Total excludes 26 cases with no information on the nature of injury.
4. Percentages may not total to 100 due to rounding
5. Data underpinning this table can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

Fractures were the most common outcome for all of the cases of hospitalised watercraft-related injury regardless of the type of watercraft. The largest proportion occurred on passenger ships (62 cases, 61%) and the smallest proportion on sailboats (18 cases, 27%). Other than fractures, notable injuries by type of watercraft were as follows:

- Open wounds occurred in 11% (11 cases) of cases occurring on passenger ships followed by intracranial injuries (8 cases, 8%).
- After fractures, the most common injuries that occurred on fishing boats were open wounds (18 cases, 20%).
- Sailboat injuries consisted of open wounds (11 cases, 17%) followed by soft-tissue injuries (7 cases, 11%) and injuries of the internal organs or vessel of trunk (7 cases, 11%).

- Soft-tissue injuries (21 cases, 16%) and intracranial injuries (14 cases, 11%) were the second and third most common types of injuries for water skiers after fractures (55 cases, 43%).

What activities were happening at the time of injury?

Unsurprisingly nearly half of all external cause based hospitalised watercraft-related injury cases had 'While engaged in sports' as the activity code at time of injury (Table 5). Not all of the sports activity codes had additional information in the record but for those that did a large number (106 cases) were related to water skiing (including water ski jumping) and wake boarding (62 cases).

Table 5: Type of activity for external cause watercraft-related injury cases, by sex, 2017–18

	Males		Females		Persons	
Type of activity	**Number**	**%**	**Number**	**%**	**Number**	**%**
While engaged in sports	482	52.9	151	40.5	633	49.3
While engaged in leisure	57	6.3	60	16.1	117	9.1
While working for income	73	8.0	8	2.1	81	6.3
While engaged in other types of work	n.p.	n.p.	n.p.	n.p.	16	1.2
While resting, sleeping, eating, etc.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other specified activity	8	0.9	n.p.	n.p.	n.p.	n.p.
Unspecified activity	277	30.4	151	40.5	428	33.3
Total	**912**	**100**	**373**	**100**	**1,285**	**100**

n.p. Not publishable due to low numbers and confidentiality concerns.

Notes:

1. Cases include those with a first or primary watercraft-related external cause code in the range V90–V94 or W02.2.
2. Data underpinning this table can be found in the accompanying supplementary spreadsheets.
3. Percentages may not total to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

The third most commonly reported activity at time of injury was working for income and almost all cases were male (73 of 81 cases). Further information on the type of work is shown on Table 6. Transport and storage work (which includes water transport) was the most commonly reported specific working for income category followed by working in the agriculture, forestry and fishing industry.

Table 6: Type of working for income for watercraft-related injury cases, by sex, 2017–18

	Persons	
Type of working for income	**Number**	**%**
Agriculture, forestry and fishing	17	21.0
Construction	n.p.	n.p.
Transport and storage	24	29.6
Government administration and defence	n.p.	n.p.
Other specified work for income	20	24.7
While working for income, unspecified	15	18.5
Total	**81**	**100**

n.p. Not publishable due to low numbers and confidentiality concerns.

Notes:

1. Cases include those with a first or primary watercraft-related external cause code in the range V90–V94 or W02.2.
2. Data underpinning this table can be found in the accompanying supplementary spreadsheets.
3. Percentages may not total to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

Where do watercraft-related injuries occur?

Limited information is available on the specific place of occurrence of watercraft-related injuries. Table 7 shows that the largest proportion of watercraft-related injuries took place in large areas of water (e.g. the sea/ocean and lakes).

Table 7: Place of occurrence for watercraft-related injury cases, by sex, 2017–18

	Males		Females		Persons	
Place of occurrence	**Number**	**%**	**Number**	**%**	**Number**	**%**
Area of still water	n.p.	n.p.	n.p.	n.p.	20	1.6
Stream of water	84	9.2	38	10.2	122	9.5
Large area of water	395	43.3	189	50.7	584	45.4
Beach	96	10.5	33	8.8	129	10.0
Other specified place of occurrence	155	17.0	56	15.0	211	16.4
Unspecified place of occurrence	n.p.	n.p.	n.p.	n.p.	219	17.0
Total	**912**	**100**	**373**	**100**	**1,285**	**100**

n.p. Not publishable due to low numbers and confidentiality concerns.

Notes:

1. Cases include those with a first or primary watercraft-related external cause code in the range V90–V94 or W02.2.
2. Data underpinning this table can be found in the accompanying supplementary spreadsheets.
3. Percentages may not total to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

Activity-based watercraft-related injury cases

This section looks at hospitalised injury cases with a watercraft-related activity code as the first or primary activity at the time of injury (1,898 cases). Of the 1,898 records with at least 1 activity-related code 1,892 had a first or primary watercraft-related activity code.

As shown in Table 8, males had more than three times as many activity-based watercraft injuries compared with females. The largest proportion of injuries by activity occurred in the 25–44 year age group and this was true for both males and females. In comparison with the distribution of cases by age and sex by external cause watercraft-related injuries, there were far fewer cases in those aged 65+, 18% for external cause-based cases compared with 6% for activity-based cases.

Table 8: Number of activity-based watercraft-related injury cases, by age and sex, 2017–18

	Males		Females		Persons	
Age group	**Number**	**%**	**Number**	**%**	**Number**	**%**
0–14	70	4.7	41	10.1	111	5.9
15–24	289	19.4	99	24.4	388	20.5
25–44	593	39.9	141	34.7	734	38.8
45–64	443	29.8	100	24.6	543	28.7
65+	91	6.1	25	6.2	116	6.1
Total	**1,486**	**100**	**406**	**100**	**1,892**	**100**

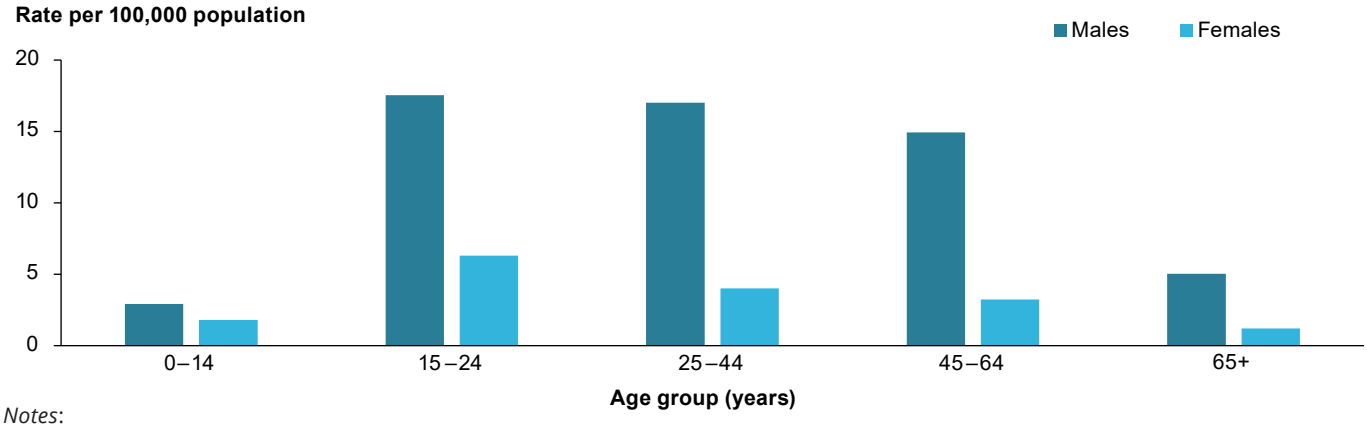
Notes:

1. Cases include those with a first or primary watercraft-related activity code U53, U54.4, U54.6, U54.7, U64.4 or U64.5.
2. Data underpinning this table can be found in the accompanying supplementary spreadsheets.
3. Percentages may not total to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

The rate of hospitalised cases with an activity-based watercraft-related injury was much higher in each age category for males compared with females (Figure 4). Higher rates of injury were still concentrated in the middle age groups for males, with the highest rate in the 15–24 group (18 cases per 100,000 population). For females, the highest rate also occurred in the 15–24 age group (6.3 cases per 100,000 population). In contrast to the age distribution of external cause watercraft-related injury cases (18%), there were fewer older Australians 65+ with an activity-based watercraft-related injury (6%).

Figure 4: Age-specific rates of all activity-based watercraft-related injury cases, by age and sex, 2017–18



Notes:

1. Includes those cases with a first or primary watercraft-related external cause code in the range V90–V94.
2. Data underpinning this figure can be found in the accompanying supplementary spreadsheets

Source: AIHW National Hospital Morbidity Database.

Type of activity-based watercraft-related injury

The most common activity being undertaken at the time of injury was surfing and boogie boarding followed by water skiing (Table 9). The estimated number of surfers in Australia in 2013 was 2.7 million. The most common self-reported cause of a surfing injury in a recent review of the literature was being struck by own surfboard (McArthur et al. 2020). Spinal injuries, including fractures, were also a noted outcome of a surfing injury when surfers strike the seafloor (usually with their head) (Dimmick et al. 2018).

Within the water-skiing category, 189 cases (43%) were attributed to wake boarding or knee boarding.

Table 9: Types of watercraft activity for activity -based watercraft-related injury cases, by sex, 2017–18

	Males		Females		Persons	
Type of watercraft activity	**Number**	**%**	**Number**	**%**	**Number**	**%**
Surfing and boogie boarding	757	50.9	176	43.3	933	49.3
Water skiing	338	22.7	99	24.4	437	23.1
Jet skiing	109	7.3	31	7.6	140	7.4
Wind surfing	79	5.3	8	2.0	87	4.6
Yachting and sailing	63	4.2	20	4.9	83	4.4
All other types of watercraft activity	63	4.2	36	8.9	99	5.2
Other specified boating sport	18	1.2	8	2.0	26	1.4
Unspecified boating sport	59	4.0	28	6.9	87	4.6
Total	**1,486**	**100**	**406**	**100**	**1,892**	**100**

Notes:

1. Cases include those with a first or primary watercraft-related activity code U53, U54.4, U54.6, U54.7, U64.4 or U64.5.
2. Data underpinning this table can be found in the accompanying supplementary spreadsheets.
3. Percentages may not total to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

Causes of activity-based watercraft-related injury

The 2 most common causes of activity-based watercraft injury hospitalisations were *Exposure to inanimate mechanical forces*, and *Transport crashes* (Table 10). The pattern of external causes of injury was the same for males and females. Details of more specific causes within these categories are given below.

Table 10: External causes of activity-based watrcraft-related injury cases, by sex, 2017–18

	Males		Females		Persons	
External cause	**Number**	**%**	**Number**	**%**	**Number**	**%**
Transport crashes	331	22.4	95	23.6	426	22.7
Accidental drowning and submersion	34	2.3	5	1.2	39	2.1
Falls	279	18.9	87	21.6	366	19.5
Exposure to inanimate mechanical forces	358	24.3	105	26.1	463	24.6
Exposure to animate mechanical forces	31	2.1	8	2.0	39	2.1
Other external causes of accidental injury	436	29.5	102	25.3	538	28.6
Undetermined intent	7	0.5	1	0.2	8	0.4
Total	**1,476**	**100**	**403**	**100**	**1,879**	**100**

n.p. Not publishable due to low numbers and confidentiality concerns.

Notes:

1. Cases include those with a first or primary watercraft-related activity code U53, U54.4, U54.6, U54.7, U64.4 or U64.5.
2. Other external causes of accidental injury include those with a first or primary code in the range X20-X59 and W75-W84.
3. 13 cases lacked a valid external cause code.
4. Data underpinning this table can be found in the accompanying supplementary spreadsheets.
5. Percentages may not total to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

Other external causes of accidental injury

The majority of these cases are non-specific X58-X59 *Accidental exposure to other and unspecified factors* (314 cases, 59%) and X50-X57 *Overexertion, travel and privation* (167 cases, 31%).

Exposure to inanimate mechanical forces

The majority of W20-W49 *Exposure to inanimate mechanical forces* cases were caused by W21 *Striking against or struck by sports equipment* (212 cases, 46%) followed by W22 *Striking against or struck by other objects* (106 cases, 23%). There were a small number of W26 *Contact with other sharp object(s)* cases (46 cases) and W23 *Caught, crushed, jammed or pinched in or between objects* (40 cases). 171 of the W21 *Striking against or struck by sports equipment* cases were surfing related, as were 60 of the W22 *Striking against or struck by other objects*, and 28 of the W26 *Contact with other sharp object(s)* cases.

Falls

Of the 366 cases attributed to a fall, 110 cases were due to a W02.2 *Fall involving water ski*. There were also 146 cases (40%) due to W16 *Diving or jumping into water causing injury other than drowning or submersion* and 118 of these occurred in surfers and boogie boarders. W16.0 *Diving or jumping into water striking or hitting bottom* caused 73 hospitalisations among surfers.

What are the challenges to reporting on watercraft-related injury?

Providing good estimates of the size and scope of watercraft-related injury in Australia is challenging. Sources of data are limited. National data on non-hospitalised watercraft injuries are not readily available for treatment by hospital emergency departments, general practitioner clinics, sports medicine centres or allied health practitioners such as physiotherapists.

Within the National Hospital Morbidity Database (NHMD), information is not always collected on the water sports or watercraft recreational activities that patients were participating in when they were injured, so the numbers of hospitalisations reported here are likely to be underestimated.

The availability of activity codes enabled us to select the hospitalisations that were attributed to a variety of watercraft-related activities. However, although the available codes are reasonably comprehensive, they do not distinguish between professional water sports/activities and community-based water sports/activities. The activity codes also do not capture new watercraft activities such as 'stand-up paddle boarding' or new types of watercraft such as flyboards or pedal kayaks. While the introduction of activity codes was a major step forward for reporting on sports injury, their utility is hampered by the fact that, in a substantial proportion of cases, hospitalisation records have either a missing or unspecified activity code. It is also possible that the quality of activity code data, when available, varies from activity to activity. For this reason, comparisons between different watercraft-related activities need to be interpreted with caution.

What data did we use?

The case data were sourced from the AIHW's National Hospital Morbidity Database (NHMD) for 2017–18, which covers all admitted episodes of care in Australian hospitals. Included NHMD records are those that have external cause codes anywhere in the record of V90 to V94 or W02.2 and/or any activity codes U53, U54.4, U54.6, U54.7, U64.4, U64.5, as well as injury as the principal diagnosis (the condition that best explains the admission), specified as International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian modification (ICD-10-AM) (ACCD 2016) codes S00–T75 or T79—but excluding any with Z50 *Care involving use of rehabilitation procedures* appearing in any additional diagnosis field. Records with mode of admission reported as a transfer from another hospital were excluded to reduce multiple counting of cases.

In addition to the usual injury case selection criteria, cases were also considered in range if they had any diagnosis of T75.1 *Drowning and nonfatal submersion* or a principal diagnosis containing a code indicating an infected wound (L02 *Cutaneous abscess, furuncle and carbuncle* or L03 *Cellulitis*) or a code indicating a joint disorder likely to be due to traumatic causes (M23 *Internal derangement of knee*, M24 *Other specific joint derangements*, M25 *Other joint disorders, not elsewhere classified* or M54 *Dorsalgia*).

The results reported here are likely to underestimate the number of hospitalised watercraft-related injury cases because, for a high proportion of the NHMD records otherwise eligible to be included the activity code was missing or unspecified.

In this report, analysis of type and bodily location of injury are based on the principal diagnosis. Cause of injury is based on the first-occurring external cause code in the record.

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Glossary

activity at time of external cause: The type of activity being undertaken by the person when injured, as represented by a code. METeOR identifier: 391320.

additional diagnosis: A condition or complaint either coexisting with the principal diagnosis or arising during the episode of admitted patient care, episode of residential care or attendance at a health care establishment, as represented by a code. METeOR identifier: 641014.

age-specific rate: The rate for a specific age group. The numerator and denominator relate to the same age group.

boats: Water-based wind or motor-powered vessels, boats, ships and personal watercraft (e.g. boats, jet skis, sail boats, yachts, catamarans).

external cause: The environmental event, circumstance or condition as the cause of injury, poisoning and other adverse effect, as represented by a code. METeOR identifier: 641415.

International Statistical Classification of Diseases and Related Health Problems (ICD): The World Health Organization's internationally accepted classification of death and disease. The Tenth Revision (ICD-10) is currently in use. The ICD-10-AM is the Australian Modification of the ICD-10 and is used for diagnoses and procedures recorded for patients admitted to hospitals.

intracranial injuries: Intracranial injuries are sometimes referred to as traumatic brain injuries. They include cases of concussion, traumatic cerebral oedema, diffuse brain injury, and focal brain injuries.

mode of admission: The mechanism by which a person begins an episode of admitted patient care, as represented by a code. METeOR identifier: 269976.

participation rate: Participation-based rates are calculated using denominator data derived from participation surveys and the number of cases of hospitalised sports injuries of equivalent sports as the numerator.

place of occurrence of external cause: The place where the external cause of injury, poisoning or adverse effect occurred, as represented by a code. METeOR identifier: 641422.

principal diagnosis: The diagnosis established after study to be chiefly responsible for occasioning an episode of admitted patient care, an episode of residential care or an attendance at the health-care establishment, as represented by a code. METeOR identifier: 640978.

watercraft: Water-based, non-powered recreational equipment such as those that are rowed or paddled (e.g. rowboats, surfboards, kayaks, canoes, stand-up paddle boards, boogie boards, windsurfers, inflatable rafts and inflatable boats without motors) and powered recreational and commercial vessels (e.g. fishing boats and passenger ships).

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