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Hazardous children's products on the Australian and US market 2011–2017: an empirical analysis of child-related product safety recalls

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ABSTRACT

Objective While there is evidence that unsafe children's products are entering the Australian market, with increasing product safety recalls, no research has examined the nature of recalls or their trends over time. This research analyses Australian and US child-related product safety recall data to better understand the frequency and nature of unsafe children's products, emerging hazard trends and cross-jurisdictional similarities and differences. Results can inform improved childhood injury prevention policy and regulation strategies in Australia.

Method Empirical analysis of child-related product safety recalls in Australia and the USA over the period 2011–2017.

Results Cross-jurisdictional comparison revealed similarities in Australia and the USA, with over 80% of recalled products occurring in four industry segments (toys/games, household furniture/furnishings, clothing and sports equipment) and a common leading hazard of choking. Australia and the USA also had a similar number of child-related recalls over the study period (Australia: 652, USA: 668). Disparate trends included a 21% decrease in US child-related recalls over the study period, with most recalled products still complying with mandated safety requirements. In contrast, Australian child-related recalls increased by 88% over the study period, with the majority of recalled products failing to comply with mandated safety requirements. Based on US child-related recall data, the leading cause of injuries was the child falling, the most severe injuries related to furniture/furnishings and the most frequent injuries related to sports equipment.

Conclusion Analysing recall data provides new insights into hazardous children's products. Cross-jurisdictional comparison of data on recalls highlights disparities and indicates a need for reforms to improve regulation of children's products in Australia.

INTRODUCTION

A misconception of many consumers about product safety is the belief that all products on the market are safe and government approved.[1] This is not the case in Australia, where few products are subject to mandatory safety standards or government approval, and there is no explicit obligation placed on businesses to supply safe products to market. For those small number of consumer products that are subject to mandatory safety requirements, the majority are children's products or general products that pose a substantial hazard to children.

Australian governments adopt a reactive approach to product safety by imposing postmarket controls to recall or ban a product from market once it has been shown to be unsafe. This approach poses significant surveillance and resource challenges for regulators due to the escalating number of consumer products available and multitude of supply channels involved.

While globalisation provides many benefits for consumers, it also increases the burden on them to assess the safety risk of a greater variety of products. Risk misperceptions can influence this process, and consumers tend to underestimate product risks associated with consumer products.[2 3] Children's developing cognitive ability impacts on their ability to assess and respond to product safety risks realistically.[3 4] Young children in particular are vulnerable, with product-related injury being highly associated with stages of childhood development and behaviours and their physical characteristics.[4]

The ability to inform consumers of product risks is challenged by the impediments in routinely quantifying product-related injury, which is poorly documented in Australian health datasets. The most recent Australian study, published in 1996, found that approximately 500 000 people sought medical attention for an injury related to product failure or malfunction, resulting in approximately 18 000 people being admitted to hospital and 200 deaths.[5] Since this study, there has been huge growth in the range of products in the Australian marketplace. No research was identified quantifying Australian product-related childhood injury.

Another opportunity to inform consumers of product risks is through dissemination of product safety information on hazardous products. A 2007 study into USA toy recalls over the period 1988–2007 demonstrates how systematic recall research can inform public debate.[6] Australian regulators do publish consumer product safety recalls but do not routinely analyse and publicly report on safety recall trends. This gap in the regulatory approach continues to exist despite evidence that unsafe children's products are entering the market, with increasing consumer product safety recalls in Australia and a growing number of banned or recalled products being resold online.[7 8] The absence of Australian recall research and reporting means there is a gap in knowledge about the nature and extent of child-related recalls and emerging trends, which impacts on the development of evidence-based prevention approaches and reform priorities.

We conducted an innovative synthesis and analysis of Australian and US child-related product safety recall data over the period 2011–2017 to identify the nature and extent of product recalls and trends over time. We used a novel method based on the Global Product Classification standard to conduct cross-jurisdictional data comparison to identify similarities and differences in child-related recall trends. In adopting this method, our research demonstrates the utility of analysing product safety recall data to identify clear trends, prevention priorities and the need for regulatory reform in Australia.

The USA was included in the study as it is a similar Western jurisdiction with a developed economy that seeks to maximise consumer choice and safety. Both jurisdictions have a centralised product safety framework with powers to prescribe safety standards and ban or recall unsafe products from the market.[9] Mandatory reporting requirements play a central role in identifying unsafe products in both jurisdictions; however, Australia's requirements are narrow requiring suppliers to report when a product caused death or serious injury or illness, while the US requirements are comparatively broader requiring suppliers to report product defects that could create a substantial product hazard or unreasonable risk of serious injury or death.[10] The USA also has the largest and longest running product-related injury surveillance system worldwide and provides open access to its product safety recall database, enabling a comprehensive knowledge-base of child-related recalls to be built.

METHOD

Data collection

Data were extracted from published consumer product safety recall notifications. USA data were accessed from the US Consumer Product Safety Commission (CPSC) recall database. Australian data were supplied by the Australian Competition and Consumer Commission (ACCC) and further accessed directly from published recall notices on the ACCC Product Safety Australia website to ensure completeness of data capture (https://www.productsafety.gov.au/recalls).

Data were restricted to recalls published in the period 2011–2017 and reviewed to identify records related to children's products and general consumer products that present a substantial hazard to children (child-related recall data). The majority of the records (91%) related to children's products, defined as a product that is designed or intended to be used primarily by persons 17 years of age or younger.[11] The remaining 9% related to general consumer products, which present a substantial hazard to children, assessed according to reported child injuries and whether the reasonably foreseeable use or misuse of the product by children is likely to result in a serious injury. Examples of general products that present a substantial hazard to children are bean bags, corded window blinds and drawers.

A child-related product safety recall database was constructed for each of the two jurisdictions. Both databases contain information on recall date, product description, supplier, location of sale, dates available for sale, defects, hazards, remedies and regulatory agency. The US database also included information on number of product units, price range, incidents and injuries and country of origin. Country of origin data were not available in the ACCC Product Safety Australia published recall notices and were, instead, extracted from Australian recalls published on the Organisation for Economic Co-operation and Development (OECD) global recall portal.[12]

Data coding

Coding of product type, hazards, injuries and non-compliance with safety regulations was conducted on the basis of narrative descriptions provided in the identified child-related recall notices. All products were classified using the GS1 Global Product Classification publication schema (published December 2017) to enable cross-jurisdictional data comparison.[13] One hazard was identified for each child-related recall; however, a second safety hazard was identified for 10% (69) of US recalls and 20% (131) of Australian recalls and a third safety hazard for 2% (USA: 13, Australia: 13) of recalls. Coding of injury mechanisms was based on the Australian National Data Standards for Injury Surveillance Version 2.1. In both jurisdictions, it is a legislative requirement for recall notices to set out any non-compliance with regulatory safety requirements.[14] Positive coding of non-compliance with a mandatory safety requirement was made if a statement of non-compliance was made in the recall notice.

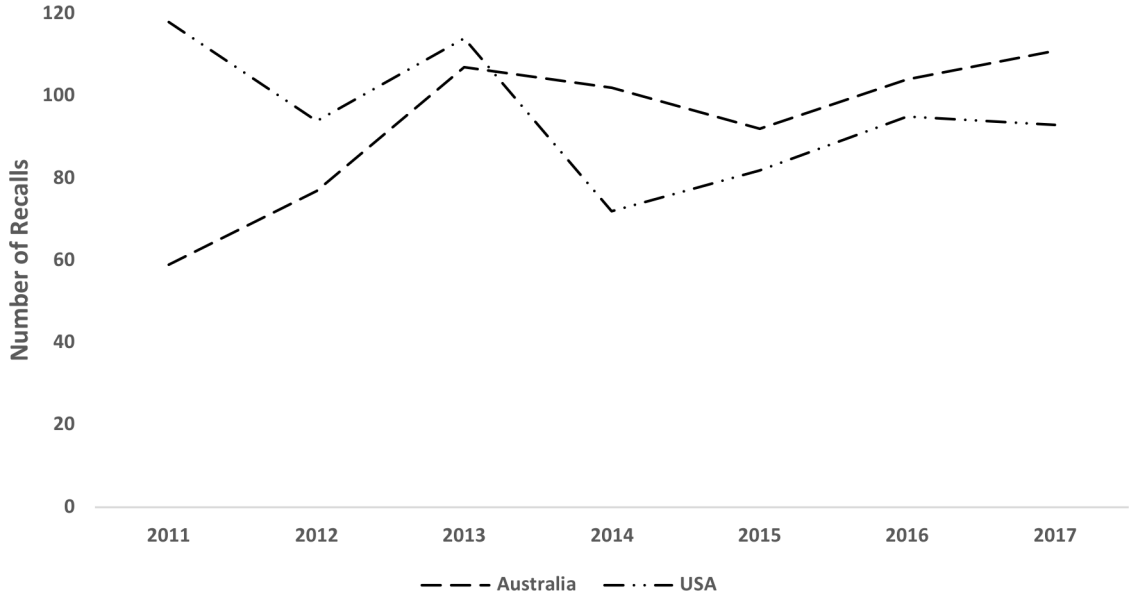

Figure 1 Australian and US child-related product safety recalls 2011–2017.

Table 1 Australian and US child-related recalls 2011–2017: leading hazards and injuries

	Recalls	Leading hazard count*	Incidents and injuries			
Australia						
All child-related recalls	**652**	**Choking (258), injuries (83), fire/burns (78)**	**Insufficient data**			
Per leading product category:						
Toys/games	241 (37%)	Choking (149), battery ingestion (35), damage to sight (29)				
Furniture/furnishings	112 (17%)	Choking (36), entrapment (34), fall (24)				
Sports equipment	92 (14%)	Fall (27), injuries (20), electric shock (19)				
Clothing	83 (13%)	Fire/burns (44), choking (23), chemical (10)				
Other†	124 (19%)	Choking (47), injuries (31), burns (16)				
USA						
			Incidents	**Fatalities**	**Injuries**	**Leading injury mechanisms**
All child-related recalls	**668**	**Choking (159), fall (128), fire/burns (98)**	15 350	**30**	1301	**Fall (48%), crushing and piercing (13%)**
Per leading product category:						
Toys/games	176 (26%)	Choking (74), laceration (25), fall (25)	3823	1‡	381	Fall (46%), struck (21%)
Clothing	144 (22%)	Fire/burns (51), strangulation (47), choking (41)	140	–	1	Thermal effect
Furniture/furnishings	121 (18%)	Fall (41), entrapment (37), strangulation (28)	1894	22	311	Crushing/struck (43%)§, fall (41%)
Sports equipment	104 (16%)	Fall (50), fire/burns (22), entrapment (10)	4032	2	452	Fall (68%), crushing and piercing (17%)
Other†	123 (18%)	Choking (30), chemical (15), ingestion (15)	5461	5	156	Unspecified (47%), crushing and piercing (22%)

*Represented as hazard count not percentage as 10% of US recalls and 20% of Australian recalls identified two hazards and 2% identified three hazards.
†Other represents 17 industry segments for Australian child-related recall data and 16 industry segments for US child-related recall data.
‡Adult fatality using inflatable water slide.
§The narrative injury descriptions were not detailed enough to distinguish between the injury mechanisms of crushing, piercing or struck and hit by contact with object.

Table 2 US child-related recalls 2011–2017: fatalities

Global product classification	No	Description
Household/office furniture/furnishings	**22**	
Household baby beds/mattresses:		
Baby cots/cot beds/bassinet	1	Entrapped and suffocated between drop-side of cot and mattress.
Baby beds/mattresses other	6	Suffocated between crib bumper and product; unspecified.
Household beds/mattresses:		
Bed frames/bedsteads (bunk bed)	1	Entrapped and suffocated in metal bunk frame.
Household/office fabric/textile furnishings:		
Window blinds	1	Strangled by blind cord.
Household/office seating:		
Bean bags/pouffes/ottomans	2	Suffocated on chair's foam beads.
Household/office storage/display furniture/screens:		
Drawers	11	Dresser tip-over deaths.
Safety/security/surveillance	**5**	
Baby safety/security/surveillance:		
Baby play pens/dens	1	Entrapped between the rails of play yard tent.
Baby safety monitoring (powered)	4	Strangled by baby safety monitoring cord.
Sports equipment	**2**	
Baby exercisers/transportation:		
Baby cot/basket (travel)	1	Suffocated in travel tent.
Prams/pushchairs/strollers	1	Entrapped and strangled between the seat and stroller tray.
Toys/game	**1**	
Indoor/outdoor games/play structures:		
Outdoor play structure	1	Fractured neck (adult) using pool water slide.
Total fatalities	**30**	

Analysis

Analysis of recall data in each database was conducted using Microsoft Excel to identify recall number trends over time, leading injuries and hazards, non-compliance with mandatory safety requirements, leading child-related recall product categories and country of origin. Percentage change over time was calculated as ((recalls in 2017-recalls in 2011)/recalls in 2011)*100. Cross-jurisdictional comparison of results was conducted to identify similarities and differences.

RESULTS

Recall number trends

The number of child-related product safety recalls for the period 2011–2017 was similar in both jurisdictions (USA: 668, Australia: 652), although the USA had a 21% decrease over 7 years, while Australia had an 88% increase over 7 years. Since 2014, the USA had fewer child-related recalls than Australia (figure 1). The 668 US child-related recalls withdrew 162 410 627 product units from the market. Recalled product unit data were not available in Australian recall notices.

Leading injuries and hazards

The inclusion of safety incident and injury information is not a requirement for Australian recall notices, and only 2% (15) of Australian child-related recalls provided information on safety incidents and injuries. In contrast, 99% (662) of US child-related recalls provided information on safety incidents and injuries. Forty-seven per cent (310) of US child-related recalls indicated there had not been a safety incident or injury, with the remaining 352 recalls reporting a total of 15 350 safety incidents. Not all safety incidents resulted in an injury, and 23% (150) of recall notices reported an injury totalling 1301 injuries and 30 fatalities. The leading injury mechanism, identified from the narrative injury descriptions in these recalls, was fall (48%) followed by crushing and piercing (13%). Table 1 provides an overview of leading hazards and injuries, and table 2 provides an overview of fatalities identified in US child-related recall notices.

In the absence of Australian safety incident and injury data, we analysed identified hazards in recall notices. The leading hazard count for child-related recalls in both jurisdictions was choking (USA: 159, Australia: 258). The Australian hazard count ranking was then injuries (83), fire/burns (78), fall (68) and battery ingestion (48), while the US hazard count ranking was fall (128), fire/burns (98), strangulation (96) and laceration (53).

Non-compliance with mandatory safety requirements

Twenty-three per cent (151) of US child-related recalls included information that identified that the product failed to comply with mandatory safety requirements, with a further 3% (20) of recalls reporting failure to meet voluntary industry standards. In contrast, the majority of Australian child-related recalls included information that reported failure to meet mandatory safety requirements (62%, 401). The percentage of recalls reporting non-compliance with mandatory safety requirements per jurisdiction is highlighted in figure 2.

Leading child-related recall product categories

All child-related recalled products were classified using the Global Product Classification standard, which has 38 industry segments at the highest level of classification. In both jurisdictions, over 80% of child-related recalled products occur in the four industry segments of: toys/games (USA: 26%, Australia: 37%); clothing (USA: 22%, Australia: 13%); household furniture/furnishings (USA: 18%, Australia: 17%); and sports equipment (USA: 16%, Australia: 14%).

Toys/games

The leading industry segment of child-related recalled products over the study period was toys/games (USA: 176, Australia: 241). US toys/games recalls decreased by 41% over the study period, and in 2017, clothing recalls became the leading industry segment in the USA followed by toys/games. Australian toys/games recalls increased by 271% over the study period.

The subclass of developmental/educational toys represents the most frequent recalled toys/games in the USA (65) and Australia (121), primarily for choking hazards (USA: 42, Australia: 94) followed by ingestion hazards including batteries and magnets (USA: 14, Australia: 20). Thirty-eight US developmental/educational toy recalls reported safety incidents that included 120 injuries such as intestinal obstructions, fractured skull, eye injuries, lacerations, bruising and minor injuries.

Nine per cent (16) of US toys/games recalls reported non-compliance with mandatory safety requirements, with the majority failing to comply with the federal lead paint standard. In contrast, 69% (167) of Australian toys/games recalls reported non-compliance with mandatory safety requirements, with the

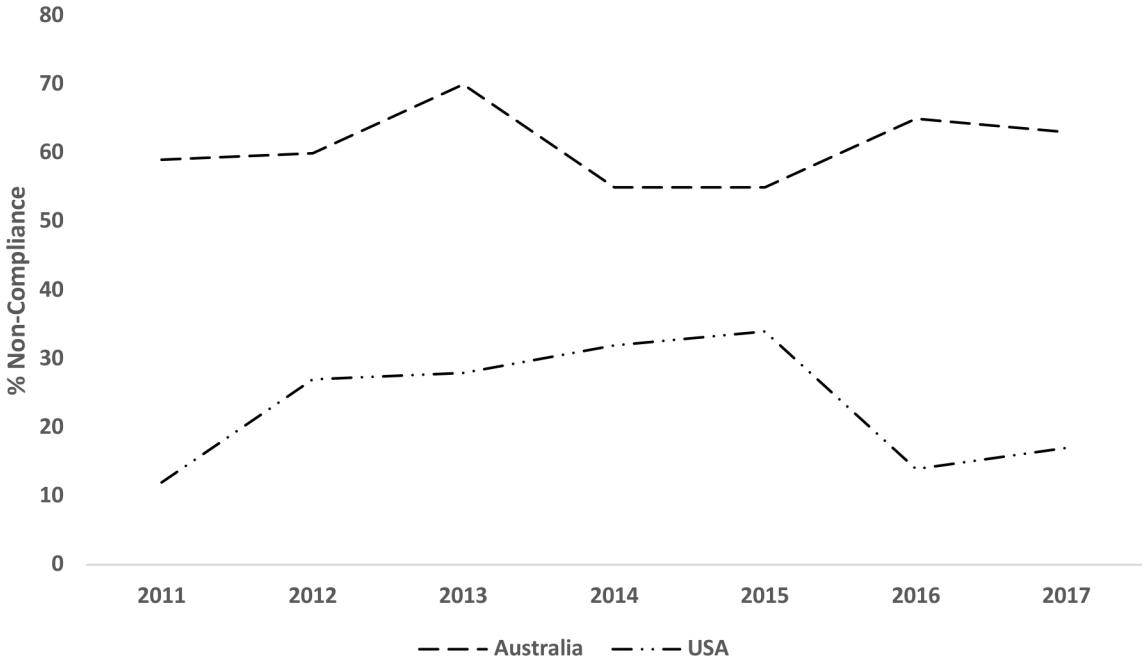

Figure 2 Percentage of non-compliant child-related recalls per jurisdiction.

majority failing to comply with the mandatory standard for toys for children up to and including 36 months.

Clothing

The second largest industry segment of US child-related recalled products over the study period was clothing, with 144 recalls identified recalling 3 080 588 product units from the market. Clothing ranked fourth in Australia with 83 recalls. The difference between the jurisdictions is linked to 48 US recalls related to drawstrings, while Australia had no recalls related to drawstrings. Removing the drawstring hazard recalls gives a more consistent pattern to clothing recalls across both jurisdictions (USA: 96, Australia 83), with the majority of recalls related to fire and burn hazards of children's sleepwear or limited daywear. High levels of non-compliance with flammability requirements were identified in both jurisdictions (USA: 51, Australia: 44). One US child-related clothing recall reported an injury, which was severe burns from pants that caught fire.

Household furniture/furnishing

Child-related household furniture/furnishing industry segment recalls ranked third in the USA and second in Australia (USA: 121, Australia: 112). This segment was linked to the most severe injuries in the USA, with 333 reported injuries including 22 fatalities. The products associated with the fatalities were spread across the industry segment subclasses (table 2). The nature of the remaining reported injuries included breathing difficulties, concussions, fractures (skulls and limbs), finger amputations, teeth injuries, lacerations, bruising and minor injuries.

For this industry segment, 78% (87) of Australian recalls indicated non-compliance with mandated safety standards. The household seating subclass and baby beds/mattresses subclass had very high levels of non-compliance, with 30 of the 33 bean bag recalls indicating non-compliance with the mandatory standard for bean bags and 31 of the 36 baby beds/mattresses recalls indicating non-compliance with the mandatory standard for household cots. US recalls had a lower level of non-compliance, with 16% (19) of US recalls indicating non-compliance with mandated safety requirements and 9% (11) indicating non-compliance with a voluntary industry standard for clothing storage units.

Sports equipment

Child-related sports equipment industry segment recalls ranked fourth in the USA and third in Australia (USA: 104, Australia: 92). This segment was linked to the most reported safety incidents and injuries in the USA, with 78% of recalls reporting a safety incident and 39% reporting an injury totalling 4032 incidents, 452 injuries and 2 fatalities. The majority of safety incidents and injuries were associated with the baby exercisers/transportation subclass with 2100 incidents, 360 injuries and 1 fatality associated with prams/strollers and 607 incidents, 16 injuries and 1 fatality associated with travel cots/baskets. A high number of safety incidents (929) were also associated with powered scooters/skateboards/hoverboards.

Country of origin

The majority of child-related recalled products were imported (USA: 605, Australia: 390), although country of origin could only be identified for 406 Australian recalls. The leading country of origin in both jurisdictions was China (USA: 439, Australia: 328) followed by domestic made products (USA: 58, Australia: 16).

DISCUSSION

Our research has identified similarities in Australia and the USA, with over 80% of child-related recalled products occurring in four industry segments and a common leading hazard of choking. Based on US child-related recall data, the leading cause of injuries was the child falling, the most severe injuries related to furniture/furnishings and the most frequent injuries related to sports equipment. These key findings assist in directing product safety education, surveillance and reform resources.

Disparities of results between the jurisdictions identified areas for further investigation. First, a disparate trend in recall numbers over time was identified, with Australian child-related recalls increasing by 88% over 7 years, while US child-related

recalls decreased by 21% over the same period (figure 1). This result is unexpected given the US consumer market is 18 times larger than the Australian consumer market[15] and suggests a need to change the reactive approach to product safety in Australia. Australian Consumer Affairs Ministers are considering a reform that would legislatively prescribe an obligation on businesses to supply safe products to market. The results of our research support the need for such a premarket product safety reform.

Second, the majority of Australian child-related recalled products failed to comply with mandatory safety requirements. While various factors might contribute to the lower level of non-compliance reporting in US child-related recalls, it is worth noting that the USA introduced conformity certification reforms in 2008 to address safety issues with imported consumer products.[16] A manufacturer of a children's product imported into the USA must issue a certificate stating that the product complies with applicable US regulatory safety requirements. The certificate must be based on third-party conformity testing and accompany the product or shipment. Australia does not have a similar conformity certification requirement, placing a significant burden on regulators to identify, test and remove non-compliant products from the Australian market. The high level of product non-compliance identified in the Australian recalls points to a need for Australia to consider additional premarket procedures, such as a conformity certification requirement for children's products of types that are subject to mandatory safety standards.

A high level of US drawstring clothing recalls was also identified. Further research found that the US CPSC had identified 26 fatalities and 41 entanglement injuries over the period 1985–2011 related to children's drawstring clothing.[17] To address the strangulation and entanglement hazards associated with these products, the CPSC deemed, in 2011, that children's clothing with neck/hood or waist/bottom drawstrings present substantial product hazards.[17] Our research identified that Australia had no drawstring-related recalls over the study period. Interrogation of injury data would be desirable to identify the extent, if any, of similar injuries in Australia.

Risk related to battery ingestion was the subject of 35 Australian recalls of toys and games. These represent 15% of all toys/game recalls identified and contributed to the 271% increase in Australian toys/games recalls over the study period. One US toy/game recall identified a battery ingestion hazard. The prominence of this type of recall in the Australian data could be linked to regulator marketplace surveillance and heightened community and supplier awareness of the battery ingestion hazard due to education campaigns, media coverage of fatal cases and the development of the voluntary Industry Code for Consumer Goods that Contain Button Batteries.

Our research identified differences in the Australian and US recall notice requirements, which provides an opportunity to make recommendations to improve the information in Australian recall notices. First, the inclusion of deidentified injury information is not a requirement for Australian recalls, and the absence of data restricts the ability to analyse injuries associated with recalls. More fundamentally, the lack of injury information in a recall notice impacts on the ability to effectively communicate the product hazard to consumers. Second, country of origin data were not available in the Product Safety Australia published recall notices and were, instead, extracted from Australian recalls published on the OECD global recall portal. The reason for this irregularity is unclear, and the inclusion of country of origin data is valuable to identify leading source countries for recalled products, which can then inform cross-border safety communications and surveillance. Lastly, Australian recalls could be improved by requiring information on the number of product units being recalled to more effectively communicate the extent of public exposure to the hazard. The addition of these requirements could be included in the ACCC Consumer Product Safety Recall Guidelines without the need for legislative change.

Potential system improvements were also identified as three different approaches were undertaken to gather Australian recall data, compared with a rapid bulk data download of US recall data. The accessibility of Australian recall data could be improved if access to the Product Safety Australia recall database was made publicly available via open data. Also, both jurisdictions would benefit from using a common product classification, such as the Global Product Classification standard, to facilitate clear cross-border communication and enable cross-jurisdictional data comparison.

Limitations

The study had a number of limitations. First, it is possible that some recalled products were not included in the study due to inadequate product descriptions or identification of paediatric injury in the recall. Second, there are limitations with comparing recall trends and reported levels of non-compliance that could be impacted by differences in a jurisdiction's product safety regulatory requirements, its regulator surveillance programme and priorities and the deterrent impact of its product liability regime. Estimates of non-compliance are also reliant on accurate reporting. Third, the study does not measure the magnitude of risk of unsafe products on the market. Lastly, there was a disparity between the USA and Australia in terms of the availability of suitably coded data on non-fatal cases.

CONCLUSION

Our research has demonstrated the utility of analysing regulatory recall data to provide new insights into hazardous children's products. Using the Global Product Classification standard has enabled cross-jurisdictional comparison of recall data, which has highlighted similarities with the majority of child-related recalled products occurring in four industry segments and a common leading hazard of choking, and disparate trends with recall numbers and non-compliance. The results inform childhood injury prevention policy and regulation strategies and add

What is already known on this subject

- Product-related injury is poorly documented in Australian health datasets.
- Children are particularly vulnerable to injury due to their inability to assess and respond to product safety risks realistically.

What this study adds

- Innovative synthesis and analysis of Australian and US child-related product safety recall data over period 2011–2017.
- Identification of the frequency and nature of hazardous children's products that have been available on the Australian and US market.
- A novel method to conduct cross-jurisdictional comparison of recall data to identify similarities and differences in recall trends.

to the current public debate about the need for urgent product safety reforms in Australia.

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11 This definition drew on the USA definition of children's product which is a consumer product that is designed or intended primarily for children 12 years of age or younger (Section 3(a)(2) of the *Consumer Product Safety Act* 1972). With an extension of age to 17 years of age or younger in accordance with the common meaning of child in Queensland (schedule 1 of the Acts Interpretation Act 1954).
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