



Preventing unintentional injuries in US early care and education: Are state regulations sufficient?

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ABSTRACT

Unintentional injuries are currently the leading cause of death among US children older than one. As many children spend significant time in non-parental child care, these injuries often occur outside of the home. This study examined US state early care and education (ECE) regulations related to injury prevention. We reviewed ECE regulations for child care centers and family child care homes through August 2018 for all 50 states and DC (“states”). We compared these regulations to six components from two national health and safety standards on injury prevention (“standards”). One state had regulations that met all six standards for both centers and homes; sixteen states had regulations that met at least five for both. Most states required child care providers to be trained in emergency preparedness (42 for centers; 38 for homes) or first aid including CPR (50 for centers; 46 for homes). Additionally, most states required providers in centers and homes to notify parents (47 and 41, respectively) and the state (40 and 41, respectively) when a child was injured; these requirements varied greatly in both the timing and manner of notification. Two-thirds of states required that providers keep copies of a completed injury form on the premises. However, few states (5 for centers, 3 for homes) required providers to take corrective action after an injury. Although most states had some injury prevention regulations, they varied greatly across states. More states should require corrective action after an injury to help prevent future injuries from occurring.

1. Introduction

Unintentional injuries, including falls, burns, and poisonings, are currently the leading cause of death among children older than age one in the United States (US) (Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2018). During the most recent ten-year period for which national data was available, 2007–2016, a total of 25,724 children ages 0 to 4 years died from unintentional injuries – another 22.4 million experienced nonfatal injuries. Unintentional injuries to young children are also costly, generating annual lifetime costs of \$25 billion in a single year, using 2010 data and prices. The good news is that injuries, like many public health problems, are largely “understandable, predictable, and preventable” (Judy, 2011).

Given that nearly 12.5 million children younger than 5 years are in some form of non-parental childcare (Laughlin, 2013), many of these

unintentional injuries are likely to occur outside of the home. A 2013 systematic review examining child care center injury rates found that there were between 11.3 and 18 injuries per 100 children per year and 2.6 to 3.3 injuries per child (Hashikawa et al., 2013). Other studies have found similar injury rates between child care centers and non-parental home-based child care (Kotch et al., 1997).

To prevent these injuries, states have enacted early care and education (ECE) licensing and administrative regulations directing child care provider injury training and reporting requirements. This study examined those state regulations to document requirements related to provider training and response to injuries among children, parental and state notifications, and steps providers must take to prevent repeat incidents. We then compared these regulations to national health and safety standards on injury prevention (Caring for Our Children: National Health and Safety Performance Standards, 2011) to determine the extent to which existing regulations align with the standards. We

Abbreviations: ECE, Early care and education; US, United States

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further documented when regulations required providers to notify parents and the state and whether these notifications needed to be in writing.

2. Methods

The lead author (ERG), a post-doctoral fellow, a graduate student and a research assistant independently reviewed ECE regulations through August 2018 for all 50 states and DC (hereafter “states”). Each individual reviewed regulations for approximately 25 states so that all states were double coded. We examined each state’s regulations to determine how well they met the National Health and Safety Performance Standards on injury prevention in *Caring for Our Children*, third edition (*Caring for Our Children: National Health and Safety Performance Standards*, 2011). The standards address pre-service training of child care providers, injury reporting requirements, and steps to prevent future injuries.

For this paper, we focused on two overarching standards and six of their component parts (hereafter “standards”). Standard 1.4.1.1 states that providers (including center and home directors, administrators, teachers, and caregivers) should have pre-service training in “[e]mergency procedures and preparedness for disasters, emergencies, other threatening situations... and injury to infants and children in care... [and in] [f]irst aid including CPR for infants and children” (*Caring for Our Children: National Health and Safety Performance Standards*, 2011). Standard 9.4.1.9 states that “when an injury occurs in the facility that results in first aid or medical attention ... the facility should complete a report form ... [that provides, among other things,] recommendations of preventive strategies that could be taken to avoid future occurrences of this type of injury” (*Caring for Our Children: National Health and Safety Performance Standards*, 2011). The report form should be signed by the parent or guardian, and document when he or she was notified and whether a written report was sent home on the day of the injury. Copies of the report form should be kept at the facility and may also be submitted to the state. Lastly, based on these forms, “the facility should plan to take corrective action” (*Caring for Our Children: National Health and Safety Performance Standards*, 2011).

As with our previous studies (Benjamin-Neelon et al., 2017; Grossman et al., 2018; Gonzalez-Nahm et al., 2017), each of the independent reviewers used a combination of specific key word searches that we identified a priori (e.g., “injury”, “injuries”, “accident”, “first aid”, “CPR”, “emergency”, “emergencies”, “disaster”, “medical”, “report”, “record”, “log”, “notify”, and “notification”) to find the relevant sections of the regulations. To ensure that all relevant text was captured, we read regulations in their entirety when they contained a section on injury prevention. Upon finding relevant provisions in the regulations, the reviewers compared them to the language of the standard. If the reviewer concluded that the provision in a state’s regulations mimicked the language, or at least addressed the concerns raised, in the standards then he or she coded that state as having met that standard. We coded regulations for two types of facilities: child care centers (hereafter “centers”) and family child care homes (hereafter “homes”). Next, the lead author reconciled the findings from all the reviewers. The team then discussed any coding differences under the supervision of the study’s principal investigator (SBN). For example, if reviewers coded a state differently in terms of whether it met the standard, the team discussed it until we reached a consensus. Most of the disagreements occurred when the reviewers interpreted the regulation or the standard differently, or when a reviewer simply overlooked relevant language from a regulation. Percent agreement between pairs of reviewers as to which states met each standard differed depending on the standard in question. For Standard 1.4.1.1, it was 64% for both components; for Standard 9.4.1.9, it ranged from 92% to 97% for each of the four components.

Table 1
Training, notification, record-keeping, and corrective action plan requirements in state regulations for child care centers and family child care homes, 2018.

	Training		Notification		Record & action	
	Training in emergency procedures	Training in first aid/CPR	Notify parents	Notify state	Keep record at facility	Take corrective action
Alabama						
Centers	–	X	X	X	X	–
Homes	–	X	X	X	X	–
Alaska						
Centers	X	X	X	X	–	–
Homes	X	X	X	X	–	–
Arizona						
Centers	X	X	X	–	X	–
Homes	X	X	X	X	X	–
Arkansas						
Centers	X	X	X	–	X	–
Homes	–	X	X	X	X	–
California						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	X
Colorado						
Centers	X	X	X	X	X	–
Homes	X	X	X	–	X	–
Connecticut						
Centers	–	X	X	X	X	–
Homes	X	X	X	X	X	–
Delaware						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
Dc						
Centers	X	X	X	X	–	–
Homes	X	X	X	X	–	–
Florida						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
Georgia						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
Hawaii						
Centers	–	X	–	–	–	–
Homes	–	X	–	–	–	–
Idaho						
Centers	–	X	–	X	–	–
Homes	–	X	–	X	–	–
Illinois						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
Indiana						
Centers	X	X	X	X	X	–
Homes	–	X	–	–	–	–
Iowa						
Centers	X	X	X	–	X	–
Homes	X	X	X	X	X	–
Kansas						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	–	–
Kentucky						
Centers	–	X	X	X	–	–
Homes	X	X	X	X	–	–
Louisiana						
Centers	X	X	X	X	–	–
Homes	–	–	–	–	–	–
Maine						
Centers	X	X	X	–	X	–

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Table 1 (continued)

	Training		Notification		Record & action	
	Training in emergency procedures	Training in first aid/CPR	Notify parents	Notify state	Keep record at facility	Take corrective action
Homes	–	X	X	–	X	–
Maryland						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
Massachusetts						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
Michigan						
Centers	X	X	X	X	–	–
Homes	X	X	X	X	–	–
Minnesota						
Centers	X	X	X	X	X	–
Homes	–	–	–	X	–	–
Mississippi						
Centers	X	X	X	–	–	–
Homes	X	X	X	–	–	–
Missouri						
Centers	–	–	X	–	–	–
Homes	–	–	X	–	–	–
Montana						
Centers	–	X	X	X	X	–
Homes	–	–	X	X	X	–
Nebraska						
Centers	X	X	–	X	–	–
Homes	X	X	–	X	–	–
Nevada						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
New Hampshire						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
New Jersey						
Centers	X	X	X	–	X	–
Homes	–	–	–	–	–	–
New Mexico						
Centers	X	X	X	X	–	–
Homes	X	X	X	X	–	–
New York						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
North Carolina						
Centers	X	X	X	X	X	X
Homes	X	X	X	X	X	X
North Dakota						
Centers	X	X	X	X	X	–
Homes	X	X	–	X	X	–
Ohio						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
Oklahoma						
Centers	X	X	X	X	X	X
Homes	X	X	–	X	–	–
Oregon						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
Pennsylvania						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
Rhode Island						
Centers	X	X	X	–	X	–

Table 1 (continued)

	Training		Notification		Record & action	
	Training in emergency procedures	Training in first aid/CPR	Notify parents	Notify state	Keep record at facility	Take corrective action
Homes	–	X	X	–	X	–
South Carolina						
Centers	X	X	X	X	–	–
Homes	X	X	X	X	–	–
South Dakota						
Centers	X	X	–	X	–	–
Homes	X	X	–	X	–	–
Tennessee						
Centers	X	X	X	X	X	–
Homes	X	X	X	–	X	–
Texas						
Centers	X	X	X	X	–	–
Homes	X	X	X	X	–	–
Utah						
Centers	X	X	X	–	X	–
Homes	X	X	X	X	–	–
Vermont						
Centers	X	X	X	X	–	–
Homes	X	X	X	X	X	–
Virginia						
Centers	X	X	X	–	X	X
Homes	X	X	X	X	X	X
Washington						
Centers	X	X	X	X	X	X
Homes	X	X	X	X	X	–
West Virginia						
Centers	X	X	X	X	X	–
Homes	X	X	X	X	X	–
Wisconsin						
Centers	–	X	X	X	X	X
Homes	–	X	X	X	X	–
Wyoming						
Centers	–	X	X	X	X	–
Homes	X	X	X	X	X	–
Total						
Centers	42	50	47	40	36	5
Homes	38	46	41	41	31	3

3. Results

We present injury regulations related to six selected standards that address ECE provider pre-service training, injury notification, record keeping and corrective action plan requirements for centers and for homes (Table 1). Notably, North Carolina was the only state with regulations consistent with all the standards for both centers and homes. Sixteen states (California, Delaware, Florida, Georgia, Illinois, Maryland, Massachusetts, Nevada, New Hampshire, New York, Ohio, Oregon, Pennsylvania, Virginia, Washington and West Virginia) had regulations consistent with all but one of the standards for both centers and homes in that state. Hawaii and Missouri had one regulation each that applied to both their centers and homes. Hawaii required first aid and CPR training for ECE providers; Missouri required parental notification for injuries. Of note, neither Louisiana nor New Jersey regulated homes within their states, so both were coded as not having met any of the standards for homes.

3.1. Injury prevention pre-service training requirements

Among centers, 42 states required training in emergency

preparedness and procedures and 50 required training in first aid, including cardiopulmonary resuscitation (CPR). Among homes, 39 states required training in emergency preparedness and procedures and 47 required training in first aid, including CPR. Although the standard, which is still in effect, requires that child care providers be trained *prior to working with children*, we counted a regulation as meeting a standard if there was any training requirement, regardless of the timing. It is important to note that the emergency preparedness and procedures standard included training for both weather-related disasters and child injuries. It was sometimes difficult to differentiate based on the wording of the regulation, and thus we were overly broad in coding this category. For example, we included states that mandated training related to fire or tornado drills. We also included states that required a written emergency response plan with the assumption (and hope) that child care providers and staff were being trained on this plan. For example, Rhode Island required both that a center “develops and implements an individualized, written plan to prepare for response to potential emergency/disaster situations” and, also, that “one fire drill is conducted every month” (Anon, 2012-a). Other states that were coded as having met the standard for similar reasoning for either centers, homes, or both included California, Illinois, Iowa, Kentucky, Minnesota, Nebraska, Ohio, Oregon, South Carolina, and Virginia.

Regarding the training in first aid including CPR requirement, some states had very strong regulations while others were quite lenient. For example, we counted both Pennsylvania centers and homes even though their regulations provided that “training may be required [in first-aid] for certain staff persons” (Anon, 2019-b; Anon, 2019-c). We also counted Minnesota centers, given that its regulation required that “the personnel record for each staff must contain ... documentation, when applicable, that the staff person has completed the first aid and CPR training” (Anon, 2019-d). However, we did not count Minnesota homes, as its regulation only required the presence of a first aid kit and first aid manual (Anon, 2019-e).

3.2. Notification requirements

Most states had regulations that child care providers must notify the parents of an injured child and the state when a child is injured in care (Table 2). Among centers, 47 states required providers to notify parents and 40 required them to notify the state. Among homes, 41 states required providers to notify parents and 41 required them to notify the state. This included states where the “notification” requirement was that providers have an injured child’s parent or guardian sign the injury form. We also included states that required providers to have a notification process or a written plan for notifying parents. For example, Michigan regulations state that centers “shall provide a written information packet to each parent enrolling a child that includes... a plan for when and how parents will be notified when the center observes changes in the child’s health ... [or] a child experiences accidents, injuries, or incidents” (Anon, 2019-f). States with similar language for centers or homes included Georgia, Minnesota, Mississippi, New York, North Dakota, Vermont, and West Virginia. We did not count a state regulation as meeting the state notification standard if it was “upon the state’s request.” For example, Rhode Island requires “children’s records [to be] subject to review and/or reproduction by the Department... upon request during the program hours of operation” (Anon, 2019-g). If, however, it was unclear if the notification was upon request or not (e.g., for homes in Tennessee) we did include that state regulation as having met the standard.

Although most states had some sort of notification for parents or states, these notifications varied greatly in both their time frame and manner of delivery. We separated regulations into three temporal categories: 1) immediately or promptly; 2) on the same day or within 24 h; and 3) more than 24 h or unspecified. We also divided regulations into those that dealt with serious injuries or deaths (e.g., anything requiring “professional medical treatment,” hospitalizations, visits to

Table 2
Parental and state notification requirements in state regulations when a child suffers an injury, 2018.

Facility type	Injury type	Parent must be notified:				State must be notified:			
		Immediately or promptly	On the same day or within 24 h	More than 24 h or unspecified	In writing	Immediately or promptly	On the same day or within 24 h	More than 24 h or unspecified	In writing
Center	Serious injury or death	30 (AL, AK, AZ, CA, DE, FL, GA, IL, IN, IA, KS, KY, LA, ME, MD, MA, MO, MS, NH, NY, OK, PA, SC, TN, TX, UT, VA, WA, WI, WY)	4 (AR, OH, OR, RI)	13 (CO, CT, DC, MI, MN, MT, NV, NJ, NM, NC, ND, VT, WV)	16 (AR, CT, DC, FL, ME, MT, NH, NM, NC, ND, OH, OR, RI, UT, VT, VA, WA)	8 (AK, DC, FL, IL, IN, MA, NY, WA)	18 (AL, CT, GA, ID, KY, IA, MD, MI, MN, MT, NE, NM, ND, PA, SD, TN, WV, WY)	14 (CA, CO, DE, KS, NV, NH, NC, OH, OK, OR, SC, TX, VT, WI)	20 (AL, CA, CO, DE, DC, IL, IN, LA, MI, MT, NH, NM, NC, OH, OK, SC, VT, WA, WI, WY)
	Non-serious injury	7 (AL, AZ, FL, GA, KS, MO, MS)	18 (AR, CA, DE, IN, IA, LA, ME, MD, NH, OH, OK, OR, RI, TN, TX, UT, VA, WI)	7 (CO, CT, NJ, NM, NC, WA, WY)	14 (AR, CT, FL, ME, NM, NC, OH, OR, RI, UT, VA, WA)	-	4 (KY, NM, ND, WY)	2 (CA, NC)	2 (NM, WY)
Home	Serious injury or death	25 (AL, AK, AZ, CT, DE, FL, IL, KS, KY, ME, MD, MA, MI, MO, MS, NH, NY, PA, SC, TX, VA, WA, WV, WI, WY)	8 (AR, CA, OH, OR, RI, TN, UT, VT)	8 (CO, DC, GA, IA, MT, NV, NM, NC)	14 (AR, CO, DC, FL, IL, IA, MT, NH, NM, NC, OH, UT, VT, VA)	8 (AK, DC, FL, IL, MA, MN, NY, WV)	19 (AL, AZ, CT, GA, ID, IA, KY, MD, MI, MT, NE, NM, ND, OK, PA, SD, VA, WA, WY)	14 (AR, CA, DE, KS, NV, NH, NC, OH, OR, SC, TX, UT, VT, WI)	17 (AL, AZ, DC, IL, MI, MT, NH, NM, NC, OH, SC, UT, VA, WA, WV, WI, WY)
	Non-serious injury	8 (AL, CT, FL, KS, MI, MO, MS, WV)	15 (AR, CA, DE, MD, NH, OH, OR, RI, TN, TX, UT, VT, VA, WA, WI)	4 (CO, IA, NM, WY)	9 (AR, CO, FL, IA, NM, OH, VT, WA)	-	6 (IA, KY, MD, NM, ND, WY)	2 (CA, UT)	3 (NM, UT, WY)

doctors, etc.) and those that dealt with non-serious injuries (e.g., “minor scrapes or bruises”). If the state’s regulation was unclear (such that it only referred to “medical care” or “medical treatment”) then we coded it for both categories of injury type.

In general, most states required center providers to notify parents of serious injuries or deaths of children, with almost two-thirds of the states requiring that notification be done immediately or promptly. However, 13 states required a notification but either had a time requirement greater than 24 h or did not specify when parents needed to be notified. This category included three states (i.e., Michigan, Minnesota, and West Virginia) where the states only required the providers to have a notification process and alert the parents about this process. There were also four states that did not require center providers to notify parents of serious injuries or deaths at all, including Hawaii, Idaho, Nebraska, and South Dakota.

Similarly, most states required home providers to notify parents of serious injuries or deaths of children, with almost half of the states requiring that notification to be done immediately or promptly. However, eight states required a notification but either had a time requirement greater than 24 h or did not specify when parents needed to be notified. This category included Georgia, which required only that providers have a notification process and alert the parents about this process. There were also 10 states that did not require home providers to notify parents of serious injuries or deaths, including Hawaii, Idaho, Indiana, Louisiana, Minnesota, Nebraska, New Jersey, North Dakota, Oklahoma, and South Dakota. Few states required parent notification to be in writing at any point in the process for serious injuries or deaths in either centers (16 states) or homes (14 states).

Whereas most states required that both centers (40) and homes (41) notify the state of a serious injury or death, these notifications usually either had to be done on the same day or within 24 h, within a time greater than 24 h, or the timing was unspecified. Only eight states for centers and eight states for homes required that the notification be done immediately or promptly. Eleven states for centers (i.e., Arizona, Arkansas, Hawaii, Iowa, Maine, Mississippi, Missouri, New Jersey, Rhode Island, Utah, and Virginia) and 10 states for homes (i.e., Colorado, Hawaii, Indiana, Louisiana, Maine, Mississippi, Missouri, New Jersey, Rhode Island, and Tennessee) did not require that child care providers notify the state in the event of a serious injury or death. Several states required the state notification to be in writing at any point in the process for serious injuries or deaths in either centers (20 states) or homes (17 states).

For non-serious injuries, over half (61%) of the states required center providers to notify parents, with the majority of those (18 out of 31 states) requiring the notification to be done on the same day or within 24 h. In seven states, centers needed to notify parents immediately or promptly; in 19 other states, there was no parent notification requirement for centers for non-serious injuries. Slightly more than half of the states (27) required home providers to notify parents of non-serious injuries. Eight of these states required home providers to notify parents immediately or promptly. In 24 states, there was no parent notification requirement for homes for non-serious injuries. Few states required the parent notification to be in writing at any point in the process for non-serious injuries in either centers (14 states) or homes (9 states). Very few states (6 for centers and 8 for homes) had regulations requiring providers to notify the state for non-serious injuries. Even among those that did, notifications were not required to take place immediately or promptly.

3.3. Record-keeping and corrective action plan requirements

Around two-thirds of states (36 for centers and 32 for homes) required that child care providers keep copies of an injury form on the premises. We also included New York whose regulation stated that child care centers and homes needed health care plans that must describe “how a record of each child’s illnesses, injuries, and signs of

suspected abuse or maltreatment will be maintained” (Anon, 2019-h; Anon, 2019-k).

Few states (5 for centers and 3 for homes) had any requirement that a child care center or home take corrective action after an incident. For example, California’s regulations for homes required that all injury reports include “steps taken to prevent the incident or injury from recurring” (Anon, 2019-i). Similar language appeared in regulations for North Carolina (centers and homes), Oklahoma (centers), Virginia (centers and homes), Washington (centers), and Wisconsin (centers).

4. Discussion

This study examined three types of injury-prevention requirements in state regulations for child care centers and family child care homes in the US. In general, most states required child care providers to have training in both emergency preparedness and first aid, including CPR. However, among centers, one state (Missouri) did not have regulations requiring training in either area and 8 states (Alabama, Connecticut, Hawaii, Idaho, Kentucky, Montana, Wisconsin, and Wyoming) did not have regulations requiring training in emergency preparedness. Among homes, three states (Minnesota, Missouri, and Montana) did not have regulations requiring training in either area and eight states (Alabama, Arkansas, Hawaii, Idaho, Indiana, Maine, Rhode Island, and Wisconsin) did not have regulations requiring training in emergency preparedness. Two states – Louisiana and New Jersey – did not regulate homes and therefore did not have regulations related to provider training. Moreover, even in states with these training requirements, the regulations varied in breadth and strictness.

Although most states required providers to notify parents or the state after a child injury or death, these notification requirements varied greatly in both timing and manner of delivery. In fact, some states had no specified timeline for when parents should be notified for either centers (11 states) or homes (9 states). Perhaps most interesting, four states for centers and ten states for homes did not have any requirement for notification of a serious injury or death.

Similarly, only two-thirds of states required centers or homes to maintain injury records on file. The national standard explains the rationale behind this requirement; namely, that “injury patterns... can be discerned from such records and can be used to prevent future problems” (Caring for Our Children: National Health and Safety Performance Standards, 2011). To this end, it is disappointing that only a handful of states required centers or homes to take corrective action after an incident. The standard describes that these actions may include “adjusting schedules, removing or limiting the use of equipment, relocating equipment or furnishings, and/or increasing supervision” (Caring for Our Children: National Health and Safety Performance Standards, 2011). Moreover, corrective actions can sometimes be easily identified and implemented because injuries to young children can frequently be attributed to identifiable hazards found in equipment, toys, and environments (Jones et al., 2018).

It is worth noting that there were a number of differences between centers and homes within some states. Although there is no substantive reason for such differences based on the ECE setting, this is similar to findings from other regulatory reviews (Benjamin-Neelon et al., 2017; Grossman et al., 2018; Gonzalez-Nahm et al., 2017).

The overall goal of state ECE licensing and administrative regulations is to govern how child care providers address injuries, and ultimately, to prevent injuries in the future. These include both the most common types of injuries children experience in child care (e.g., falls, burns, and poisonings), but also the less common types (e.g., sudden unexpected infant death syndrome). This study provides a baseline for analyzing how consistent state ECE regulations are with national injury prevention standards. Notably, only one state has regulations consistent with all the national standards, and only sixteen additional states’ regulations are consistent with all but one of the national standards. Future research is needed to estimate the proportion of injuries which

occur in ECE settings for each state and then evaluate whether having these injury prevention regulations is related to lower overall injury rates. In the meantime, it is incumbent upon states to consider enacting regulations that align with national health and safety standards.

Additionally, parent and state injury notification are also important in reducing and preventing future injuries. For example, a process exists if a specific product is defective or causes injury – namely, to alert the US Consumer Product Safety Commission (CPSC). These data help the CPSC respond with product recalls as needed. By requiring a process for parent and state notification – including requiring the notifications to be in writing – the state has data about where and how children are being injured, which allows it to act to prevent future injuries in ECE settings. However, many states do not have requirements for parent and state notification. Even among those that do, notification rarely needs to be in writing. Requiring written parent and state notification of child injury can be codified in state ECE regulations.

This study does have several limitations. First, we examined only state ECE regulations and there may be other laws or statutes that address injury prevention or safety in this setting. Second, although this study is current through August 2018, states may enact new ECE regulations at any time and as a result this review may already be outdated. Third, these regulations may not reflect actual practice in ECE settings. For example, individual child care providers and ECE programs may do more than is required by state regulations. In contrast, states may not all be equally enforcing these laws, so individual child care providers and ECE programs may also be doing less than is required by state regulations. In practice, providers may be reacting very differently to child injuries and future research could compare provider behavior to existing state regulations. Fourth, this study does not address or provide evidence demonstrating that if these standards were followed then injuries in ECE settings would be prevented. Future research could evaluate the relation between following these standards and injury prevention. Fifth, although the standards were created through a consensual process based on both opinion and empirical evidence, it is not clear which specific evidence was used to support these standards. And, sixth, we focused on these two standards and six of their components because we perceived them as both timely and important. However, there are several other standards and components that focus on injury prevention and future studies can and should explore the extent to which states meet these standards.

5. Conclusion

In this national review of state regulations, we found that many states required child care providers to be trained on emergency preparedness and first aid, including CPR. However, given the high percentage of children in care and the large numbers of injuries that occur each year, all states should have regulations that meet all the national injury prevention standards. It is disheartening that few states required any sort of corrective action to prevent future injuries from occurring. Moving forward, states should consider amending their ECE regulations to better conform to the national standards on injury prevention. As states move in this direction, we would encourage that they establish injury prevention priorities and that these priorities be evidence-based to the extent possible. This could include requiring ECE settings to maintain better records on injuries within their facilities, to review and discuss data from these records, and to learn from these injuries to

prevent future child injury and death. Public health and injury prevention professionals can be useful partners in supporting these actions.

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Declaration of competing interest

The authors do not have any conflicts of interest to report.

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References

- Anon 214 R.I. Code R. § 40 00 01(1.8) (L)(6)(a) (2019a).
- Anon 055 Pa. Code § 3270.31(E)(4) (2019b).
- Anon 055 Pa. Code § 3290.31(E)(4) (2019c).
- Anon Minn. R. 9503.1760 (D) (2019d).
- Anon Minn. R. 9502.0435 (7) (2019e).
- Anon Mich. Admin. Code r. 400.8146(1)(h) (2019f).
- Anon 214 R.I. Code R. § 40 00 01(1.12)(F)(4) (2019g).
- Anon N.Y. Comp. Codes R. & Regs. § 418-1.11(c)(2) (2019h).
- Anon Cal. Code Regs. Tit. 22, § 12-3-102416.2 (2019i).
- Anon N.Y. Comp. Codes R. & Regs. § 417-1.11(c)(2) (2019k).
- Benjamin-Neelon, S.E., Gonzalez-Nahm, S., Grossman, E., et al., 2017. State variations in infant feeding regulations for child care. *Pediatrics* 140 (6), e20172076.
- Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Early Care and Education Programs. 3rd ed. Elk Grove Village, IL: American Academy of Pediatrics; 2011.
- Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2018. Web-Based Injury Statistics Query and Reporting Systems (WISQARS) [Online]. [Cited December 9, 2018]. Available at: www.cdc.gov/injury/wisqars.
- Gonzalez-Nahm, S., Grossman, E.R., Frost, N., Benjamin-Neelon, S.E., 2017. Early feeding in child care in the United States: are state regulations supporting breastfeeding? *Prev. Med.* 105, 232–236.
- Grossman, E.R., Gonzalez-Nahm, S., Frost, N., Benjamin-Neelon, S.E., 2018. Childcare providers' possession or use of marijuana, tobacco, or alcohol while caring for children: a comparison of US state regulations. *Am. J. Public Health* e1–e6.
- Hashikawa, A.N., Newton, M.F., Cunningham, R.M., 2013. Unintentional injuries in child care centers in the United States: a systematic review. *J of Child Health Care* 19, 93–105.
- Jones, V.C., Shields, W., Ayyagari, R., Frattaroli, S., McDonald, E.M., Gielen, A.C., 2018. Association between unintentional child injury in the home and parental implementation of modifications for safety. *JAMA Pediatr.* 172 (12), 1189–1190.
- Judy, K., 2011. Unintentional injuries in pediatrics. *Pediatr. Rev.* 32, 431–438.
- Kotch, J.B., Dufort, V.M., Stewart, P., et al., 1997. Injuries among children in home and out-of-home care. *Injury Prevention* 3, 267–271.
- Laughlin, L., 2013. *Who's Minding the Kids? Child Care Arrangements*: Spring 2011. US Census Bureau, Washington, DC.