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## Slime product injuries managed at emergency departments



Homemade slime is promoted as a substance that can be produced by children at home or at school. One version of homemade slime uses water, borax (sodium tetraborate), and Elmer's glue, and sometimes food coloring, glitter, or other additives. The American Chemical Society website provides directions for this version of homemade slime [1].

Recipes for homemade slime and its use have been around for years. However, in 2016 and 2017 its promotion on social media, such YouTube and Instagram, increased interest in the substance [2,3]. News stories reported increases in sales of glue linked to homemade slime [3].

At the same time as homemade slime's increased popularity have been reports of injuries when making or playing with the substance [2]. There is limited information on the potentially adverse effects of exposure to homemade slime. One meeting abstract described 38 inquiries involving 41 patients exposed to homemade slime reported to French poison centers during 2010–2017 [4].

The National Electronic Injury Surveillance System (NEISS) operated by the United States Consumer Product Safety Commission (CPSC) collects data on consumer product-related injuries in the United States from the emergency departments (EDs) of approximately 100 hospitals as a probabilistic sample of the more than 5000 hospitals with EDs in the United States [5]. Injuries to slime products or the ingredients being used to make slime in NEISS during 2001–2017 were identified by searching the Narrative\_1 and Narrative\_2 text fields for any mention of the terms “slime,” “borax,” “borate,” and “boric.” The resulting records were then reviewed to determine whether the substance involved in the injury appeared to be a slime product. Exposures to slime that were clearly not a product (e.g., slime on a rock) were excluded.

Twenty-seven injuries related to slime products were identified during 2001–2017. One (3.7%) case was reported in 2003, one (3.7%) in 2009, one (3.7%) in 2014, one (3.7%) in 2016, and 23 (85.2%) in 2017; 21 (87.5%) of the injuries were reported during May–December 2017. Seventeen (63.0%) of the cases suggested that the slime product was homemade. Eleven (40.7%) of the cases mentioned one or more of the ingredients used to make slime, and 5 (18.5%) mentioned that borax was specifically involved in the production of the slime. The distribution of the cases by route was 10 (37.0%) dermal, 6 (22.2%) ocular, 5 (18.5%) ingestion, 3 (11.1%) otic, 1 (3.7%) inhalation, and 2 (7.4%) unknown route. Of the ten dermal exposures, 4 (40.0%) involved the hand, 4 (40.0%) the finger, 1 (10.0%) the face, and 1 (10.0%) the upper trunk. Ten (37.0%) of the injuries occurred at home, 4 (14.8%) at school, 2 (7.4%) at sports, and 11 (40.7%) at an unknown location.

Seven (25.9%) of the patients were age five years or less, 16 (59.3%) 6–12 years, 3 (11.1%) 13–19 years, and 1 (3.7%) 20 years or more; the mean age was 10 years (range 0–38 years). Twenty-three (85.2%) of the patients were female and 4 (14.8%) were male. The distribution by race/ethnicity was 12 (44.4%) white, 4 (14.8%) black/African American, 6 (22.2%) other, and 5 (18.5%) not specified.

Twenty-five (92.6%) of the patients were treated and released from the ED and 2 (7.4%) left without being seen. The reported symptoms were dermal burn (4), conjunctivitis (2), ocular pain (2), rash (2), blurred vision (1), cellulitis (1), contact dermatitis (1), dermal pain (1), dermal redness (1), dizziness (1), fever (1), headache (1), itching (1), laceration (1), lethargy (1), oral pain (1), peeling skin (1), urticaria (1), and vomiting (1).

In summary, slime product injuries reported to the NEISS increased greatly in 2017, after the promotion of homemade slime in 2016 and 2017 on social media increased interest in the substance. The exposures were most likely to occur by dermal, ocular, and ingestion routes and occur at home or in school. Patients tended to be children and female and did not need to be admitted to a healthcare facility. Continued surveillance of social media and healthcare data may be useful to determine whether interest in homemade slime, and the injuries that may result from its production and use, will continue or wane over time.

## Declarations of interest

None.

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## Dextrose dilution for pediatric hypoglycemia



Emergency physicians (EPs) commonly treat hypoglycemia. When parenteral dextrose is required for an adult patient, EPs feel comfortable ordering “1 ampule of D50”, which amounts to 25 g of 50% dextrose in sterile water. However, a solution of D50W is a significantly hypertonic solution. When a child has hypoglycemia, concentrations of dextrose must be lower than 50% due to increased risk of small vein sclerosis. Hypertonic solutions may lead to osmotic diuresis and tissue damage if extravasated. Furthermore, smaller gauge intravenous catheters typically used in

**Table 1**  
The “rule of 50” for dextrose use in hypoglycemia.

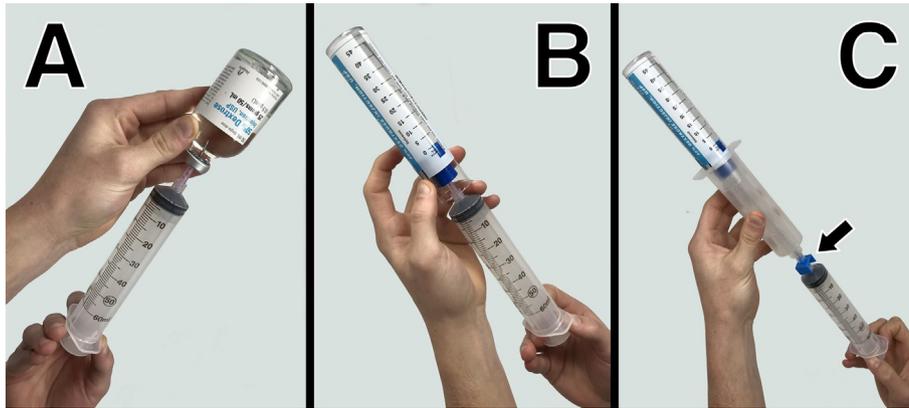
	Dextrose concentration	Dose	Product of dextrose concentration and dose
Newborn/infant	10% (D10W)	5 mL/kg	50
Child	25% (D25W)	2 mL/kg	50
Teen/adult	50% (D50W)	1 mL/kg	50

children place veins at higher risk of extravasation. Hypertonic fluids also carry a higher risk of thrombophlebitis. The American Society for Parenteral & Enteral Nutrition (ASPEN) recommends that continuous parenteral nutrition not exceed 900 mOsm/L in pediatric patients [1]. Infusions with concentrations higher than

1000 mOsm/L are associated with higher risk for thrombophlebitis or infiltration [2]. While the concern for thrombophlebitis may be less in bolus infusions, boluses are more likely to extravasate than continuous infusions.

The Pediatric Advanced Life Support program (PALS) recommends that children receive 25% dextrose and that newborns receive 10% dextrose for hypoglycemia [3]. The “rule of 50” (Table 1) can be used to remember PALS recommendations for age- and weight-based pediatric dextrose dosing [3]. The dextrose concentration multiplied by the dose in mL/kg should equal 50. However, the rule of 50 is only useful when clinicians have ready access to D10W and D25W in addition to D50W.

Despite recommendations that emergency departments stock lower concentrations of dextrose for pediatric patients [4,5], we



**Fig. 1.** Drawing up the D50W. An 18 gauge needle may be inserted directly into a vial (A) or the rubber piston of a 2-part syringe (B), or a transfer device (arrow) may be used (C).

## DEXTROSE DILUTION

Draw up a D50W volume in mL to match the desired concentration, then dilute to 50 mL total volume with sterile water.

[www.thegurneyroom.org](http://www.thegurneyroom.org)



**Fig. 2.** Dilution instructions and QR code link. Point your smartphone camera at the QR code or use a QR code reader to access a link to download this phone-size infographic to your mobile device.

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have found D50W to be more readily available in resuscitation situations. Emergency department staff may be more familiar with D50W than D10W or D25W. While several studies evaluate the use of D10W for patients of all ages in the prehospital setting [6,7], D50W continues to be the most common formulation used to treat hypoglycemia in adults in U.S. emergency departments. Unlike D50W and D25W, premixed syringes of D10W are not commercially produced, so D10W must be infused from a bag or withdrawn from the bag in order to be administered.

The following technique allows for the creation of any dextrose concentration lower than 50% from D50W, and the resulting mixture is ready for push infusion from a 60 mL syringe. Gather a D50W ampule or vial, a 60 mL luer-lock syringe, an 18 gauge needle or a transfer device, and enough sterile water to dilute the mixture. Draw up an amount of D50W in the 60 mL syringe that matches the desired concentration of dextrose. For example, draw up 10 mL to create D10W, and 25 mL to create D25W. The D50W may be drawn into the 60 mL syringe either directly with an 18 gauge needle, or by using a transfer device (Fig. 1). Dilute the mixture to 50 mL total volume with sterile water, label appropriately, and mix by inverting the syringe and then turning it upright several times. Some 60 mL syringe manufacturers place a circle around the 50 mL marker, which can serve as a memory aid. The operator can potentially make any concentration of dextrose lower than 50% using this technique. As an example, 12.5 mL of D50W diluted to 50 mL with 37.5 mL of sterile water would create D12.5W. The most useful dextrose concentrations to an EP, however, are D10W and D25W. The final volume of 50 mL will often allow for additional boluses as needed. Used in conjunction with the “rule of 50”, this technique allows for treatment of hypoglycemia at any age (Fig. 2).

If sterile water is unavailable, normal saline can be used to dilute the D50. In the case of dilution to D10, this will be 1 part D50W (osmolarity 2552 mOsm/L) and 4 parts normal saline (osmolarity 308 mOsm/L). The osmolarity of this mixture will be 757 mOsm/L  $[(4 \times 308 + 2552) / 5]$ , which is higher than D10W (505 mOsm/L) but still lower than the recommended maximum osmolarity for a pediatric peripheral infusion. The additional sodium and chloride would also need to be considered in the context of the resuscitation.

We created a video demonstration of the technique and uploaded it to YouTube (<https://youtu.be/CdArekqU2u4>).

In the future, D10W may gain wide acceptance for hypoglycemia treatment at all ages in the United States, simplifying treatment. This transition occurred in the United Kingdom in the early 2000s and has been advocated for in Australia [6,7]. Until the United States adopts this practice, our technique offers a straightforward means to dilute dextrose by hand. For EPs working in emergency departments that do not have D25W and D10W readily available, this technique may be used to rapidly create these concentrations in order to treat pediatric hypoglycemia.

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## Effects of videolaryngoscopes on cognitive workload during tracheal intubation performed by emergency residents



Tracheal intubation using direct laryngoscopy (DL) is the gold standard for airway management during resuscitation of severely ill patients [1]. The procedure may be challenging even for experienced physicians. In prehospital settings, tracheal intubation may be even more difficult considering unfavorable conditions such as poor or bright light, narrow space, and uncomfortable position of rescuers [2]. Lack of practice by emergency physicians due to the small number of procedures performed each year adds to the difficulty [3]. These two additional factors may be associated with lower success rates [4] and worse outcomes [5].

Videolaryngoscopes (VL) are devices developed to address the difficulties associated with tracheal intubation [6]. VLs provide indirect view of upper airway using optical or video camera technology, thereby improving glottis visualization compared to DL [7], but have not been associated with better first attempt success rate or shorter time for tracheal intubation when performed by experienced physicians [8]. Besides technical performance, usability is an important factor that may be associated with tracheal intubation failure [9] that can be assessed using cognitive workload. Cognitive workload is defined as the level of overall effort expended by individuals in response to a task and is closely related to the usability of devices having been developed to fulfill this task. High cognitive workload is associated with greater number of medical errors and worse outcomes [9]. We hypothesized that VL use could be helpful for emergency novices by reducing cognitive workload during challenging tracheal intubation.

In an experimental study, two VLs (APA [BD Carefusion, USA] and AT [Vygon, France]) were compared to DL in a randomized order through two consecutive simulated situations (easy and prehospital scenarios). Emergency residents with little experience in tracheal intubation were enrolled in the study. They attended theoretical and practical training courses prior to inclusion.

The easy scenario was conducted using fresh cadavers with good laryngeal visibility on DL installed in supine position on a dissection table in a room with sufficient luminosity. The prehospital