

The Potential Risk to Children Associated with Excessive use of Disinfectant Against Coronavirus Disease (COVID-19)

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Graphical Abstract



Figure

Abstract

In late December 2019, the acute respiratory syndrome coronavirus 2 (SARS-CoV-2) emerged in Wuhan, China, and described as a novel coronavirus disease (COVID-19). While the virus rapidly spread through populations has shocked the entire population. Since there were no therapies initially, health practitioners advise washing hands often with soap and using alcoholic hand sanitisers. However, dry skin and alcohol poisoning are also possible side effects of alcohol sanitisers. Children are thought to be more vulnerable to alcohol poisoning, which is a severe health issue. Therefore, precautionary measures should be taken to protect children from the potential hazard of disinfectants.

Keywords: COVID-19; Disinfectants; Alcoholism; Children; Risk

Introduction

Disinfectants sprayed in school are potential harms to children, and kids are the ultimate explorers. Everything is new, and they are eager to learn. However, their methods of investigation primarily involve touching and tasting everything. While germs are year-round, and it is a tremendous concern for parents, avoiding illness and infection is incredibly stressful during the COVID-19 pandemic. At the same time, the novel coronavirus can live hours to days on a variety of surfaces [1]. The virus spreads quickly through hand-to-face contact, specifically the eyes, nose, and mouth. While baby wipes might be an easy go-to, it is not recommended for handwashing by the Centers for Disease Control and Prevention [2]. Currently, schools are reopening, but there is another issue yet we have to face; a disinfectant. Disinfectants are chemical which kills the germs and are pretty effective against the viruses to limit the spread of viruses.

On the other hand, these disinfectants are lethal to human health from mild to fatality. Especially the kids are the most vulnerable among the humans (Table 1). Disinfectants are powerful tools to reduce the chance of contracting viral infections, and it is also the possible harm if being utilized or stored inappropriately.

Day of the Month	January	February	March	April	May	June	July	August	September
1	41	48	55	67	74	67	57	69	52
2	50	38	63	63	66	64	57	55	67
3	49	76	89	71	62	50	61	90	67
4	36	61	107	58	84	64	41	86	90
5	43	63	99	42	72	55	48	74	59
6	51	75	81	77	58	52	57	80	71
7	45	72	53	66	53	50	71	78	53
8	62	42	51	64	72	65	72	70	83
9	55	62	110	57	52	52	101	78	84
10	50	62	86	57	74	64	107	73	85
11	48	41	127	55	67	56	70	70	69
12	48	65	130	39	64	66	73	67	61
13	32	81	101	55	58	50	100	83	53
14	55	61	75	52	77	45	98	107	72
15	53	35	69	61	64	52	98	87	87
16	56	28	78	62	51	67	84	69	74
17	59	39	89	65	49	72	75	76	109
18	46	69	67	56	70	62	56	63	71
19	40	52	87	55	53	53	61	74	60
20	42	57	74	85	65	63	76	77	64
21	63	74	93	73	53	54	89	75	83
22	55	47	54	53	60	72	65	65	81
23	60	49	60	70	47	61	85	73	70
24	58	63	79	71	67	74	80	85	82
25	36	77	75	59	59	64	78	75	84
26	57	54	76	42	62	66	63	78	67
27	72	62	69	73	59	63	90	68	70
28	57	63	64	86	62	71	84	76	78
29	57	58	55	76	58	66	76	69	88
30	63		67	72	59	74	81	72	79
31	71		83		54		82	90	
Total	1610	1674	2466	1882	1925	1834	2336	2352	2213

Table 1: Children (Age 12 and younger) daily number of exposure to disinfectants in 2020.

Note: Data adapted from Hand Sanitizer by American Association of Poison Control Centers (AAPCC), 2020.

Retrieved from <https://aapcc.org/track/hand-sanitizer>.

Following the COVID-19 outbreak in December 2019 [3]. The World Health Organization recommended disinfectants to prevent infection, and alcohol use in hand sanitizer has risen. However, the American Association of Poison Control Centers (AAPCC) recorded about 9500 alcoholism cases in the first five months of 2020 [4]. Another study reported that hand sanitiser usage was linked to these incidents in kids under 12. Furthermore, even a modest amount of alcohol in youngsters can induce poisoning, nausea, and sleepiness, progressing to alcoholism [5]. Figure 1 depicted the adverse effects of alcohol on children.

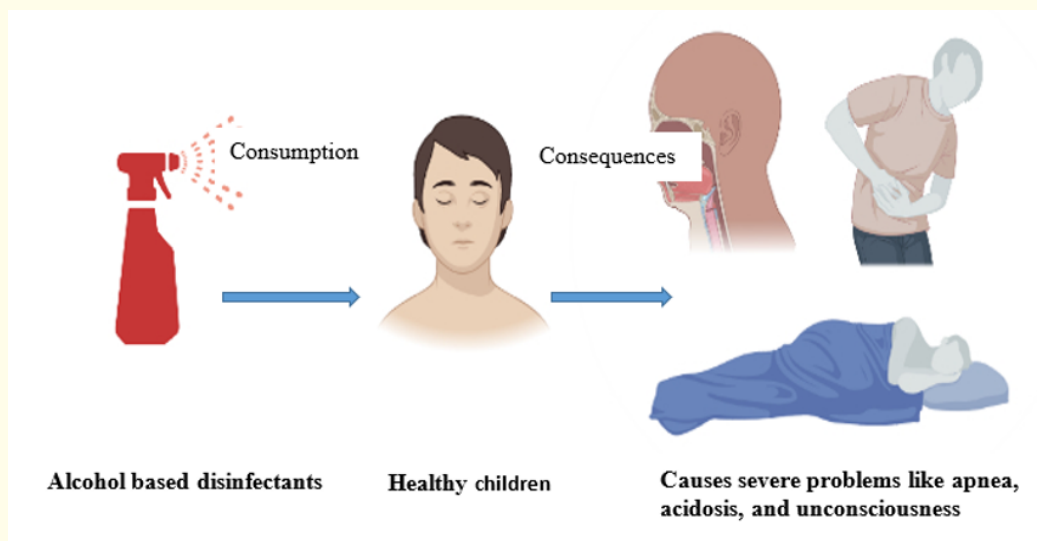


Figure 1: Diagram showing the adverse effect of disinfectants in children.

Alcohol can also lead to respiratory arrest and death in extreme cases. At the same time, the most effective disinfectant is packaged in brightly coloured bottles and has a pleasant odour, similar to candy or any good food, which appeals to children. If children lick a small quantity of disinfectant to sample it, they are unlikely to become ill; the flavour they ingest is far more dangerous than the risk of alcohol poisoning [6]. Compared to adolescence, children’s especially neonates, are more prone to become ill due to alcoholism. Also, the glycogen storage in little children’s livers decreases, causing them more resistant to hypoglycemia and increasing specific pharmacokinetic reasons, making them more susceptible to alcoholism [7]. According to recent research, children that ingest alcoholic sanitiser have significant difficulties such as apnea, acidosis, and unconsciousness.

The CDC researcher examined data from the National Poison Data System (NPDS) on children under 12 who had been exposed to hand sanitiser between 2011 and 2014. The research examined two age groups: 0 - 5 and 6 - 12. About 70,669 persons in this age range utilised hand sanitisers, with 92% using alcohol-based disinfectants and the remaining 8% using non-alcoholic disinfectants [7].

To further minimise the spread of SARS-CoV-2, the CDC recommends safe and proper disinfection of high-contact surfaces [2]. However, the number of chemical exposures cases recorded from January 2020 to March 2020 is compared to the same three-month study from 2018 and 2019 and the public health agencies COVID-19 cleaning guidelines and broadcasting to be equal to the chemical exposures numbers reported to the NPDS, CDC, and the National Association of Poison Control Centers Monitoring Team (NAPCCMT) [2]. These data were submitted to the NPDS between January and March 2020, based on call data from 55 poison centres throughout the United States. In comparison to January to March 2019 (37,822) and January to March 2018 (39,122), the poison centre received details about detergents

(28,158) and disinfectants (17,392) from 45,550 contact calls, indicating that cases increased by 20.4% and 16.4%, respectively, in 2020. Although the NPDS data does not indicate a strong link between COVID-19 cleaning efforts and exposure, there does appear to be a significant temporal connection with the increased use of these items. Early in March 2020, the number of regular calls to poison centres from people who had come into contact with detergents and disinfectants increased significantly (all ages group). However, during the three-month study period, annual exposure of children under age five years accounted for a significant portion of the overall call rate, ranging from 39.9% to 47.3%. Additional review of the rise in calls from 2019 to 2020 (3137 detergents and 4591 disinfectants), total incidents include 1,282 cases, and total death cases include 4,226 possible related deaths. The findings showed that bleach had the highest increase (1,949; 62.1%) of all detergent types, while non-alcoholic disinfectants (1,684; 36.7%) and hand sanitisers (1,684; 36.7%) had the largest increases. The disinfectant group has the highest increase in inhalation of all exposure routes from 2019 to 2020. All detergents increased by 35.3 percent (from 4,713 to 6,379), while all disinfectants increased by 108.8% (from 569 to 1,188) [4].

On the other hand, school closures have a strong negative impact on children's health, education, growth, family income, and the overall economy. Governments at all levels should continue to invest in education by implementing robust, multi-layered policies. Children's education, general well-being, health, and safety should all be considered when making decisions. All decisions would affect children, parents or guardians, teachers, other staff, and the community and society. From the standpoint of public health, the decision to close or reopen a school should be made on a risk-based basis, considering the local epidemiology of COVID-19 and educational institutions' willingness to adjust to the healthy operation of their programs.

Responsibilities of parents and school administration

Children should not use disinfectants, like disinfectant wipes, since they are more susceptible to ingesting them. A "keep out of reach of children" statement must appear on all disinfectant labels. However, disinfectants are effective tools for preventing disease transmission, but they can endanger children's health if used or stored incorrectly. The Environmental Protection Agency (EPA) is responsible for ensuring that operations carried out according to label directions do not adversely affect human health. Also, anyone using disinfectants in a child's environment should adopt best practices to ensure that the disinfection is safe and efficient. Disinfectants that have been approved by the Environmental Protection Agency (EPA) should only be used on surfaces, not on humans. As a result, it cannot be applied to the skin or eaten [8]. Handwashing with soap and water for at least 20 seconds is a better way to avoid COVID-19. If soap and water are not available, a hand sanitiser with at least 60% alcohol content should be used. Swallowing a small amount of hand sanitiser can lead to alcoholism in children. Simultaneously, many hand sanitisers contain alcohol (methanol, ethanol, or isopropanol), which can cause significant mortality and morbidity [9,10]. Symptoms of intoxication include mortal lethargy, hypoglycemia, annexation, and unconsciousness. Kids and adults can also become septic after using methanol-containing hand sanitisers (also referred to as wood alcohol). The use of methanol in hand sanitisers is unlike. However, these items have been recalled recently. While repeatedly using methanol on the skin or its consumption is poisonous. This can lead to nausea, vomiting, headache, blurred vision, blindness, convulsions, coma, and permanent damage to the nervous system or death [10]. More records of accidental exposure to children have been received by the NPDS, as people bought more sanitisers during the pandemic. In the first half of 2020, 46% more hand sanitiser cases were registered than in the same timeframe last year. Numerous reports were about children under the age of 5. Therefore, to destroy the virus that causes COVID-19, health experts suggest using 60% to 95% alcoholic hand sanitiser. While drinks typically contain 5% to 40% alcohol. The US Food and Drug Administration (FDA) has approved few sanitiser manufacturing companies during the pandemic. Parents should confirm that the ingredients, warnings, and precautions are indicated on the bottle when buying a sanitiser. To minimise the risk of harm caused by children drinking sanitisers, also manufacturers should add additives to make them bitter. This significant move helps prevent children from consuming the food. However, the FDA has issued alerts that some young people are attempting to drink a hand sanitiser from a distiller, and these hand sanitisers have not yet taken steps to do so [11]. To guarantee that the scent of the disinfectant does not attract children, the term "denatured" in the container should be checked. Parents can even quest for denatonium benzoate (Bitrex), sucrose octa-acetate,

or butanol (also called tert-butyl), bitter. Some sanitisers are made of isopropanol (isopropanol). Special attention should also be paid to disinfectants around children since they are more hazardous than items made with ethanol-lack of hand sanitiser during COVID-19. While driving, home sanitisers are not a good option. In addition, the FDA warns that hand sanitiser may be ineffective if misused, and there are reports that homemade hand sanitiser can burn the skin [11].

Suggestions for parents

Parents should not allow children to access hand sanitisers easily and do not use them by themselves. Instead, spray that pinch of disinfectant into few a child's hands and make sure they rub their hands in front of parents or teachers. This can also help to ensure that children use the product correctly to get the full benefit. Mixing two cleaning products or making your own "instant" products can be dangerous. Bleach can be an excellent disinfectant. It is needed to use a small amount to remove bacteria and viruses on the surface [12,13]. When disinfecting surfaces, dilute the bleach according to the manufacturer's instructions, usually 1/3 cup of bleach per gallon of water. Cleaning and disinfecting products that should be used on surfaces must not be used or sprayed on the skin. Make sure the use of the product for its intended purpose. After cleaning, the product should be kept out of the reach of children. Parents and caregivers should balance working at home while doing other chores at home. Make sure to immediately put the cleaning product in a safe place out of the reach of children. There is a lot of helpful information on product labels, especially where and how to use the product safely and effectively. Also, the parents should visit the product or brand website for more useful information.

Conclusion

Specific and transparent data analysis is required to provide realistic guidance on achieving optimal disinfection and disinfection targets in childcare settings. Providing effective control of infectious diseases has always been the sole goal of decision-making in procedures for the disinfection of children, but the exact purpose has not been clarified. The analysis shows that the existing regulations cover goods that have a significant proportion of their effect on children's health. In addition, research has documented possible hazards to children and workers from exposures related to these disinfectants, and inadequate attention has been given to the health hazards caused by by-products used for disinfection. There is a necessity to properly balance the pros and cons of disinfecting children and childcare facilities. Proper disinfection procedures are critical for the prevention of infectious diseases in childcare settings. However, there could be more forms and where this disinfection is performed. The uniqueness of child care centres is that children still need to disinfect products even though the potential health hazards. Thus, clinicians, scientists, supervisors, teachers, and parents must come together first to understand which organisms we should try to disinfect in the nursery environment, which products can best do this-the potential adverse effects of using these products around our children.

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Competing Interests

The authors declare that they have no competing interests.

Ethical Approval

Not required.

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