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Avoiding a crisis at Christmas: a systematic review of adverse health effects or 'Chrishaps' caused by traditional hazard sources and COVID-19

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In their timely 2020 editorial,¹ Vally and Grills explored how to save Christmas in the era of SARS-CoV-2/COVID-19 and how the activities of Santa Claus can take place under the circumstances of a pandemic. "[I]s the risk too great?" they asked. After offering their epidemiological and public health expertise, they concluded how modifying some work practices could protect both Santa and those he visits to allow COVID-safe Christmas days.

Also last Christmas, Ferner et al. reported on "Harms and the Xmas factor".² In closing, they asked "is it worth it?" and compared Christmas costs (harms) and benefits. Case reports and data about Christmas hazards were presented. For example, they referred to cases that may instigate a smile although the background might be a serious disease like "The propagation of syphilis by toys".² A 2009 article by Grills and Halyday³ dealt with the question of Santa Claus' dubious public health credentials. When the authors challenged Santa as a healthy role model, they used circumstantial information and pointed to his smoking and overeating. Moreover, Santa's potential role as an infectious disease vector who may become "a contact tracer's nightmare"³ was emphasised. This should now be updated with regard to COVID-19.¹

Our aim was to systematically collect scientific evidence of adverse health effects associated with Christmas in terms of hazards to which we refer as "Chrishaps" (we expressly mean

Abstract

Objective: To complement the 2020 ANZJPH editorial "How COVID-safe Santa can save Christmas". In addition to a concise update regarding SARS-CoV-2/COVID-19, we aimed to explore some risks of Christmas in terms of adverse health effects, which we call 'Chrishaps'. Our overall study question was "which hazards have been scientifically associated with old Christmas essentials such as decoration, gifts, menus, and Santa himself, as well as new challenges associated with COVID-19?"

Method: We searched the PubMed, Web of Science, and Open Grey databases systematically and Google unsystematically.

Results: Thirty-six pertinent articles – most of them case reports or retrospective analyses – documented Chrishaps.

Conclusion: Overall results suggested that Chrishaps come in different shapes and guises.

Implications for public health: Chrishaps pose a potential minor public health threat that should be borne in mind every festive season. Assessing and discussing specific public health implications of Chrishaps requires systematic risk research to be conducted.

Key words: Christmas, mishaps, incidents, Covid-19

not only injuries from accidents or falls, but also threats to health from other risks such as high-fat foods or allergenic substances). To this end, we conducted a systematic literature review regarding the conceivable novel festive hazards posed by COVID-19 and regarding injuries, mishaps, and accidents around traditional hazard sources. To this, we added results from an unsystematic Google search about Chrishaps.

Methods

Our May 7 literature search was conducted in the PubMed, Web of Science and Open

Grey databases. We included all studies or reports in English, which focused on Chrishaps, particularly associated with decoration, gifts, menus, and Santa himself, and with the new challenge COVID-19. We excluded studies or cases not clearly related to Christmas or dealing with human tragedy due to psychiatric disorders, self-harming behaviour, violence, or car accidents⁴ around Christmas. Likewise, articles containing recommendations or indications of hazards without individual or aggregated injury-data or designating the sources were not considered. For detailed information on the search string, inclusion

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Submitted: August 2021; Revision requested: November 2021; Accepted: November 2021

The authors have stated they have no conflicts of interest.

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Aust NZ J Public Health. 2022; 46:32-5; doi: 10.1111/1753-6405.13207

criteria and exclusion criteria, as well as the number of results (PRISMA Flow Diagram) see Box 1. Our systematic literature search was complemented by an unsystematic Google search for keywords like “Christmas” in connection with “injuries” or “accidents”.

Results

After applying the exclusion criteria, 30 articles remained from the systematic literature search,^{1,2,5-32} most of them case reports or retrospective analyses. For detailed information about publication type, occasion, and the Chrishaps from the included papers see Table 1.

From these 30 articles, seven^{6,10,13,15,18,20,23} related to allergic/irritating or phototoxic

reaction, six^{14,17,25-28} to inhaling, ingestion, or swallowing objects, another six^{5,7,8,16,21,29} to (over)eating and drinking, five^{9,11,19,24,30} to falls/injuries, and three^{1,31,32} to COVID-19. Three articles^{2,12,22} could not be adequately sorted into any of the above groups. In addition, six articles were identified via the Google search.³³⁻³⁸

Discussion

Last Christmas, Vally and Grills¹ offered a timely exploration of whether Santa could represent a novel hazard when he became infected with SARS-CoV-2 and becoming a vector of the virus and COVID-19. If so, not only Santa but also the families he visits could be at risk from SARS-CoV-2.^{1,31} Yet, the authors

concluded that – with appropriate counter-measures – there should be minimal risk posed by Santa, and a COVID-safe plan was suggested. However, in some nations, such as Scotland and England, where travel and mixing restrictions were lifted for Christmas day,³² it appears plausible that infection rates rose as a result – even if this is difficult to attribute as causal due to the festive period coinciding with the rise of a new strain of the virus.³² Thankfully, safe and effective vaccines shall enable safer festive days for this Christmas.

But beyond the possible impact of the novel hazard SARS-CoV-2/COVID-19, what Chrishaps might we expect?

Our literature searches revealed various hazards. Allergic reactions were demonstrated to Poinsettia or *Euphorbia pulcherrima Willd* (a popular Christmas plant), Christmas trees, candles, or even gifts like a donated laptop.^{2,6,13,15,20,23} Moreover, poisoning from plants like Poinsettia or holly is known and contact can lead to contact dermatitis.^{10,18} Also described were intoxication (e.g. by glow sticks), aspiration or swallowing of Christmas decoration (including a Christmas tree-bulb or other glass ornaments, confetti stars, button batteries, a plastic robin or a plastic Christmas tree) or Christmas candies.^{2,7,14,17,25-28,36}

Even more astonishing was a case report of supposed cyanosis induced by the staining of a blue bed linen as a Christmas gift.¹²

Another qualifier for a Christmas gift, viz Christmas mail, has proven hazardous even before the festive days when a finger tip was lost in a mailbox together with the dropped off Christmas letters.¹¹

No reports could be found that either Santa Claus himself or one of his companions were involved in accidents which should reassure insurance agencies.³⁰ For the important question whether the risk of falling is greater with Santa's costume and Christmas sack than without, an empirical ‘yes’ was reported.²²

But what about those who Santa visits? When decorating, there is a risk of falling, for example, when putting up residential Christmas lights²⁴ or decorating the interior. Among these risks, falls from ladders or roofs were the most common, but also from furniture, with some significant injuries like lacerations, strains and sprains, or fractures.^{19,24,33,35-38} Lifting heavy objects (e.g. a box of decorative materials) may cause injury to the lower back.³⁸

Box 1: Search string, inclusion / exclusion criteria, flowchart.

Search string

PubMed / Web of Science:

(“accident*” OR “advers*” OR “event*” OR “mishap*” OR “misfortun*” OR “disaster” OR “harm*” OR “incident” OR “decoration” OR “light*” OR “fire” OR “flame” OR “kitchen” OR “snow” OR “ice” OR “toy” OR “holly” OR “poinsettia” OR “COVID” OR (“mistletoe” AND “kiss*”) OR (“mistletoe” AND (“STD” OR “disease*”)) OR “Christmas pudding”) AND (“Christmas” OR “Xmas” OR “winter holiday”)

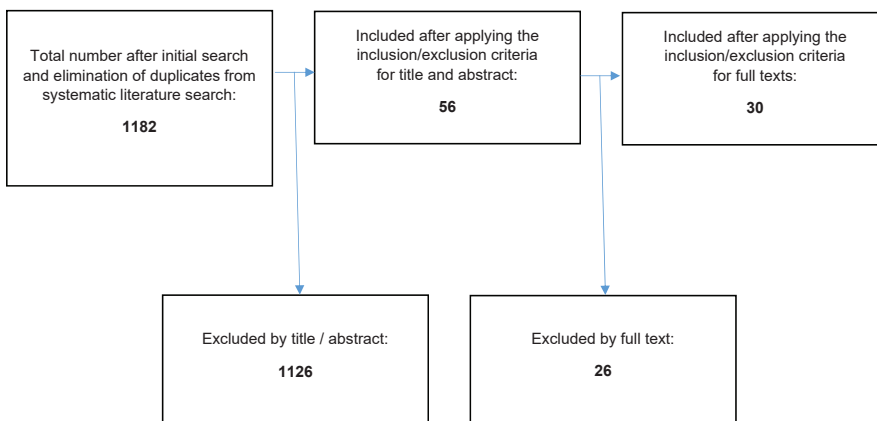
Open Grey:

(“Christmas” OR “Xmas”)

Inclusion / exclusion criteria

Inclusion criteria	Exclusion criteria
(Case) reports or studies about accidents, mishaps, injuries, health impairments related to Christmas	Topic not clearly related to Christmas
	Article dealing with “human tragedy”: psychiatric disorders, self-harming behaviour, violence, or car accidents
	Language not German or English
	Articles without source of data

Flowchart of the systematic literature search



Christmas dinners³⁵ also posed risks. We cherish Christmas as a time for good food, drink and merriment. Yet, the (in)famous Christmas pudding (especially well known in Great Britain) must be appreciated as a potential health hazard due to the alcohol and ethyl carbamate it contains^{16,21} (especially when doused in brandy and set alight). Overeating ('calorie overload'), to our surprise, has been rarely identified⁵ as a Chrishap in our systematic literature search. However, a positive correlation between Christmas and higher cholesterol values was reported²⁹ and, perhaps unsurprisingly, weight gain was associated with Christmas.³⁴ Two other risks

from eating were documented: abdominal pain after eating without chewing²⁶ and eating a piece of Christmas cake together with a plastic robin.⁷ Other observed phenomena included higher-pitched voices in men⁸ and a decrease in female pregnancies reportedly due to hormones in battery turkeys.⁸

Importantly, with regards to Chrishaps it may not only be of interest what factually happens but also to whom and how long effects may last. In this vein, the 18th President of the United States, Ulysses S. Grant, experienced his Chrishap as a life-changing experience: slipping on black ice in a Christmas fall, he

probably sustained a hip fracture but it was deemed as a muscle strain, which plagued him ever after, possibly due to Chrishaps-associated mis-diagnosis.⁹

Given the potential hazards and Chrishaps documented, implications for public health may need to be explored to reduce such risks. Systematic risk research is required given the majority of articles were case reports. To assess and discuss specific public health implications of Chrishaps higher level studies are needed along with targeted injury surveillance. Overall, further research and effective information may limit Chrishaps and ensure we have a safe and merry Christmas.

Table 1: Results from the systematic literature search: Publication type, occasion, and Chrishap.

Reference year	Publication type	Occasion	Chrishap
Anonymous 1946 ⁵	Essay	Eating Christmas pudding	'calorie-overload'
Wyse 1970 ⁶	Experimental study and retrospective analysis	Allergies from Christmas trees	26 (1.66%) in retrospectively analysed cases 94 (5.6%) identified via prospective analysis
Kiff 1983 ⁷	Case report	Eating Christmas cake	Peritonitis in a 86-year-old woman after having Christmas cake with a plastic robin eaten along
Alderman 1985 ⁸	Report/ Retrospective analysis	Exposures at Christmas fayre	Changes in voice pitch, inhalation of foreign bodies, and alcohol problems
Lewis 1987 ⁹	Case report	Slipping on icy ground on Christmas eve 1883	General Ulysses S. Grant's probable hip fracture in 1883 was mis-diagnosed as muscle rupture
Massmanian 1998 ¹⁰	Case report	Trimming a Poinsettia plant two days before Christmas	Phototoxic reaction with erythematous, papulovesicular, hyperpigmented lesions on a 56-year-old woman's face
Godwin 1999 ¹¹	Case report	Posting Christmas cards in letter boxes	Amputation of a 59-year-old woman's finger tip
Barron 2001 ¹²	Case report	Exposure to blue-coloured bed linen as Christmas gift	'Cyanosis' suspected in a 18-year-old woman which was due to blue skin discoloration by the textile
Ibanez 2004 ¹³	Case report	Exposure to Poinsettia plant	IgE-mediated rhinitis and asthma in a 6-year-old boy with latex allergy
Philip 2004 ¹⁴	Case report	Inhaling a small plastic Christmas tree	Acute airway obstruction in a 2-year-old boy caused by the laryngeal foreign body
Bala 2006 ¹⁵	Case report	Exposure to Poinsettia plant as a gift during a hospital stay	Symptoms of a latex allergy (macular rash) in a woman with a latex allergy due to the plant
Hasnip 2007 ¹⁶	Experimental study	Measurements in Christmas pudding	Christmas pudding contained 20 µg/kg ethyl carbamate
Kimia 2009 ¹⁷	Retrospective analysis	'Holiday-related injuries' related to Christmas ornaments	Ingestions were the mainly found injuries, followed by lacerations and eye injuries
Petersen 2011 ¹⁸	Retrospective analysis	Plant exposures leading to calls to poison centre	An average of 3.4% of human exposures involved plants: Poinsettia at rank 3, holly at rank 4
Gordon 2013 ¹⁹	Literature review	Falls/injuries related to Christmas activities	Mostly vertebra fractures, followed by fractures of the lower limb
Jacob 2014 ²⁰	Case report	Laptop as a Christmas present	Dermatitis in an 11-year-old boy caused by nickel sulfate allergy
Brieger 2014 ²¹	Systematic review and experimental study	Alcohol consumption by medical personnel during Christmas lunch	Consumption of Christmas pudding marginally affected blood alcohol levels
Donath 2015 ²²	Experimental study	Physical demands on Santa Claus	Spatio-temporal gait, balance, and ground reaction reduced when wearing a Santa Claus costume
Wedi 2016 ²³	Report/literature review	Allergy triggers around Christmas	All types of allergies due to Christmas trees, Poinsettia, Christmas decoration, candles, and food
Driedger 2016 ²⁴	Retrospective analysis	Falls and severe trauma associated with putting up Christmas lights	Neurologic (e.g. subdural hematoma) and thoracic traumas (e.g. rib fractures) were most frequent
Carsin 2017 ²⁵	Case report	Aspiration of a LED-bulb as Christmas decoration	Aspiration in a 14-month-old girl
Verma 2017 ²⁶	Case report	Swallowing peppermint Christmas candies in whole	Epigastric abdominal pain in a 86-year-old edentulous man
Cairns 2018 ²⁷	Retrospective analysis	Exposures to glow sticks	Ingestions followed by ocular exposures
Heyworth 2019 ²⁸	Case report	Swallowing a Christmas confetti star	Retropharyngeal abscess in a 9-month-old girl
Vedel-Krog 2019 ²⁹	Cohort study	Exposure to Christmas holidays	Positive association between Christmas holidays and total cholesterol/LDL values
Lauche 2019 ³⁰	Retrospective analysis	Injuries to Santa Claus himself or his helpers or his impersonators	6,351 injuries related to sleds and toboggans, 213 related to chimneys, but the injured party could not be clearly identified
Ferner 2020 ²	Literature review	Christmas harms	Examples included falls, poisoning, inhalations, ingestions, and dermatitis
Vally 2020 ¹	Editorial	Hazards for/by Santa Claus in COVID-19	Santa has different risk factors for COVID-19, but it is unlikely that he would spread the virus
Wormser 2020 ³¹	Letter to the Editor	Questioning whether Santa Claus should work in COVID-19-times	Santa Claus is not expected to be at risk for either acquiring or transmitting COVID-19
Griffin 2021 ³²	BMJ News	Christmas festive period	Rise of COVID-19 registered deaths

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