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Records from the Swedish poisons information centre as a means for surveillance of occupational accidents and incidents with chemicals

Linda Schenk[a,*], Karin Feychting[b], Anita Annas[b], Mattias Öberg[a,c]

[a] Unit of Work Environment Toxicology, Institute of Environmental Medicine, Karolinska Institutet, P.O. Box 210, 17177 Stockholm, Sweden
[b] The Swedish Poisons Information Centre, 171 76 Stockholm, Sweden
[c] The Swedish Toxicology Sciences Research Center (Swetox), Forskargatan 20, 151 36 Södertälje, Sweden

ABSTRACT

We present a retrospective analysis of records on occupational accidents from the Swedish Poisons Information Centre. The aim was to explore these data as a means for surveillance of accidents and incidents with chemicals at the workplace. We extracted data on all telephone consultations regarding occupational incidents (n = 8240) during 2010–2014. One third of the calls were made by health care staff (31%) and two thirds were made by the public (69%). For the latter group, about half (54%) received advice on how to manage on site. One out of five workplace incidents were assessed by the operating expert (pharmacists and physicians) as a major risk for severe symptoms. The three most commonly reported chemical groups were alkali (n = 1510, excluding ammonia), hydrocarbons (n = 1129, including halogenated hydrocarbons) and acids (n = 984). Eye exposure was the most common exposure route recorded (n = 3049), followed by inhalation (n = 2635) and skin (n = 1438). Data from the Swedish Poisons Information Centre offers insights about occupational accidents and incidents with chemical products and also include a higher number of accidents in absolute numbers as compared with the official injury statistics. With a clear focus on type of poisoning agent, treatment and health effects, poisons information data may serve as a means for surveillance on chemical incidents at the workplace.

1. Introduction

Occupational use of chemical substance is the origin of a wide variety of occupational injuries, and statistics on occupational diseases and accidents are part of the foundation for identifying proper risk management efforts. In Sweden, the Swedish Work Environment Authority (SWEA) is responsible for occupational health and safety and also compiles the Swedish statistics on occupational diseases and accidents reported by the employers. However, despite obligation to report accidents and severe near-accidents (Swedish Parliament, 1977), it is highly likely that occupational disease and injury statistics underestimate the incidence of chemical incidents and accidents and injuries. Employers may lack awareness of reporting requirements, or may perceive other disincentives for instance that reporting would be incriminating or too time-consuming. Organisational factors such as safety incentive programs that penalise accidents and injuries may also disincentive employees from reporting injuries to their employers (e.g. US GAO, 2012). The incompleteness of occupational injury and disease statistics is a well-known issue also in other countries than Sweden (e.g. Gravseth et al., 2003; Leigh et al., 2004; Walters et al., 2011; Probst et al., 2013). In addition, the Swedish reporting requirements are limited to comparatively severe accidents, i.e. accidents that led to sick-leave or incidents that could have led to very severe consequences. This incomplete decision-basis may reduce efficiency of SWEA's risk management measures.

Another source of data on occupational related chemical accidents is the Poisons Information Centers (PICs). PICs provide information on risks, symptoms and treatments in case of acute poisonings with different agents, e.g. chemical products, pharmaceuticals and biological toxins. In Sweden there is only one PIC unit, established in 1960, that serves the whole country (population of 9.8 million inhabitants). The 24 h phone service is manned by pharmacists and physicians specialized in intensive care. The service is open to medical professionals as well as the general public and all telephone consultations are logged in the PIC database. The Swedish PIC is connected to the emergency response number. There is also a general Swedish health care information number, from which all calls concerning potential poisonings, including eye and dermal exposure to chemicals, are forwarded to the PIC. Furthermore, the Swedish PIC is appointed the Swedish responsible body for receiving information relating to emergency health response

* Corresponding author.
E-mail address: linda.schenk@ki.se (L. Schenk).

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under Article 45 of the EU Regulation (EC) 1272/2008 on classification, labelling and packaging (CLP) and hence administers a database of chemical products on the Swedish market. Through the database the PIC can advise e.g. physicians on the nature of exposure based on product name. In addition, the PIC is the Swedish International Chemical Environment (ICE) Centre, i.e. the Swedish part of a European network of emergency response centers for chemical accidents, initiated and financed by the chemical industry. The Swedish PIC is thus a central component in several information chains concerning chemical agents and products.

In their function as a source of information for the public, workplaces and health care personnel, PICs receive a substantial number of calls regarding workplace exposures (Litovitz et al., 1993) for which the overlap with other established occupational surveillance systems has been found low (Blanc and Olsen, 1986). There are several examples of the use of PIC data to investigate exposures to specific product groups such as pharmaceuticals (e.g. Smith et al., 2008) or pesticides (Olson et al., 1991; Meulenbelt and de Vries, 1997; Sudakin and Power, 2007) but also to specific population groups such as workers in small enterprises (Hinnen et al., 1994) or adolescents in the work-force (Woolf et al., 2001). In the present work we explore how the data from the Swedish PIC may provide knowledge about accidents and incidents with chemicals at the workplace.

2. Methods

We present a retrospective review of five years (2010–2014) of Swedish PIC records. Furthermore, official statistics on the number of employed men and women in Sweden per month during the investigated period were collected from Statistics Sweden (SCB, 2016). Official statistics on occupational accidents were compiled from the SWEA's online database over occupational accidents (ISA, 2016). These data are reported by employers for accidents where the employee has been, or is expected to be, on sick-leave for at least one day. The data were analyzed using cross-tabulation and descriptive statistics. Ethical vetting was applied for and approved by the regional ethical board in Stockholm.

2.1. Compilation of PIC data

All PIC database entries categorized as occupational accidents involving adults (due to PIC categories 18 and 19 year olds were also excluded) logged between January 1st 2010 and December 31st 2014 were extracted (n = 9266). The extracted information was imported to a spreadsheet format, cleaned and recoded when necessary for the purpose of the present study. The resulting database is outlined in Table 1.

Repeated calls about the same incident, identified using the PIC cross-referencing, were consolidated into the same incident entry. Calls that are connected to incidents where the emergency care personnel asked precautionary questions about their or other patients' safety (for instance need for decontamination of the patient before entering the emergency room) were also consolidated into the primary incident.

The PIC recording of poisoning agents mainly relates to area of use (e.g. pool chemical, cleaning agent) and, if known, complemented with some specific chemical substances/groups (e.g. hypochlorite, alkali). Gases are generally logged depending on their health effects (e.g. irritant, systemic toxicity, inert). More details of the poisoning agent might also be specified in the free-text fields. Depending on the information provided by the callers and the PIC expert's interpretation the poisoning agent in a specific case might be logged differently in a second or third call, making the recoding of the poisoning agents in the cases necessary. For the purpose of the present study we categorized the poisoning agents according to chemical groups. When available, detailed information about the chemical identity was collected from the free-text fields.

3. Results

From the 9266 telephone consultations concerning occupational exposures during 2010–2014, we extracted information on 8240 separate occupational incidents (Table 2). The number of occupational incidents for which PIC has been contacted each year has increased by 30% from 2010 (n = 1411) to 2014 (n = 1831), with the largest difference occurring between 2011 and 2012 (Table 2). Dividing these numbers by the total number of employed individuals in Sweden shows that the increase seen in PIC records is larger than the simultaneous increase in employment (Fig. 1). In 2010 the PIC records identify 3.2 accidents per 10,000 employed and year (n.b. Fig. 1 shows the corresponding numbers per month), for 2014 the corresponding number is 3.9 per 10,000, i.e. an increase of 21%.

However, it is the number of calls from the public that have increased over the years (in total a 43% increase from 2010 to 2014). The number of calls from health care actors has been around 500 incidents per year (range 484–546, Fig. 2). During the same period, the number of reported accidents caused by hazardous materials (n.b. includes not only poisonings but also heat burns etc.) that resulted in sick leave in the official Swedish statistics has increased 80% from 2010 to 2014 (Table 3).

A majority of first calls are made by the public (n = 5697), while about one-third of first calls are from a health care actor (Table 2). One out of five incidents were classified as potentially posing a major risk to the exposed individual (Table 2). Among calls from the public, i.e. exposed individuals not yet in health care 54% received advice on how to manage on site (Table 2). Generally, cases where the PIC expert judged the exposure to pose minor risk were manageable on site, e.g. diluted acid on small part of skin that was advised to rinse exposed skin with water for at least five minutes. Cases judged to pose a major risk were all advised to seek health care, e.g. alkaline products in the eye, for which immediate health care was advised in addition to continuous rinsing of the eye. The advice regarding health care varied for the category moderate risk depending on the nature of the exposure, health care was either advised immediately or in case symptoms worsen or persist within a certain time-frame. Among the 4381 cases judged to pose a moderate risk, 30% were already in health care (indicated by caller), another 31% received the advice to seek health care for examination and/or treatment.

Some differences based on gender are discernible from the material presented in Fig. 1 and Tables 2 and 3. Of the recorded incidents 68% concern male workers (n = 5638) and 30% concern female workers (n = 2440). In 2% of cases (n = 162) the gender was not recorded. Participation on the labour market is comparatively equal between genders in Sweden, hence as with the absolute numbers presented in Table 2, the number of accidents per 100,000 employed women and month is around half that of men (on average 1.9 and 3.9, respectively).

At first sight, the gender distribution of our material is similar to that of the number of reported accidents with hazardous materials that resulted in sick leave in the official Swedish statistics (on average 31% of injured are women, Table 3). However, it should be noted that almost all accidents leading to any sick leave probably would be judged as sufficiently severe to be categorized as a major risk by the PIC experts. In our material, 24% of incidents judged to pose a major risk concerned women. Calls concerning women are hence more likely to have been judged as minor risk incidents while cases involving male patients were more likely to be judged as major risks (chi-square statistic is 63.8, df = 3 and the P-value is < .00001, unknown gender and confirmed severe outcomes removed, n = 8071). Among the seven cases verified as severe six concerned men. Among calls concerning female patients not yet in health care (n = 1958), 58% received the recommendation to manage on site. For male patients not yet in health care (n = 3671) the corresponding number was 52%. Furthermore, calls concerning patients in health care more often concern male patients than female patients (77% of calls from health care actors