Management and control of agri-chemical pesticides: any progress?

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Abstract

Issues related to agri-chemical pesticides usage and poisonings in South Africa have been well documented. Under-reporting of information required to determine the size of the problem complicates current surveillance and prevention programmes. The study aimed to determine: the procedure for reporting and follow-up of cases of agricultural pesticide poisonings; which factors contributed to the poisoning cases, and whether a biological monitoring programme was in place at the time of 110 reported cases of agri-chemical poisonings on farms in the Boland Health District between 1997 and 2000. A retrospective descriptive survey design involving a record review was applied.

The study found that the cases were poorly reported. The follow up system at the local level between local government officials and the farmers was not efficient for the prevention of agri-chemical poisonings. The contributory factors were insufficient information and training; the incorrect use of personal protective equipment; the lack of safety of the agri-chemical store; and the absence of a monitoring system on the majority of farms.

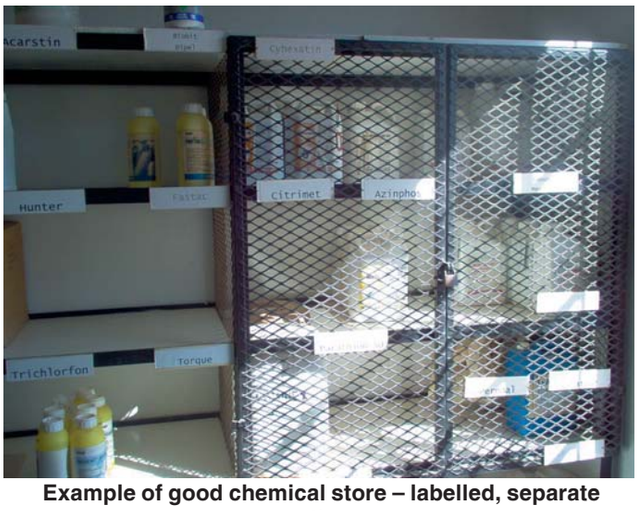
This study demonstrated that the notification of agricultural chemical poisoning was applied in a fragmentary manner between the different governmental levels and departments.

Introduction

The utilisation of agri-chemical pesticides in South Africa and problems surrounding safe use, monitoring, and notification of cases of poisonings have been well documented.[1-5] Major issues are the paucity of data on pesticide-related morbidity and mortality and the gross under-reporting of cases to appropriate authorities. Furthermore, studies found that where cases were notified, crucial information was missing on the required forms.[2,6] Consequently, the size of the problem could not be accurately determined for planning and implementing appropriate preventive programmes.

Legislation enforced by the Department of Labour that is applicable for the safe handling of hazardous chemicals in the agricultural sector includes the Occupational Health and Safety Act[7] (OHSA), and its associated Hazardous Chemical Substances Regulations.[8] Both apply to agricultural pesticide handling and its management and provide clear guidelines on the safe handling, storage and management of agricultural pesticides as well as rules for chemical handlers. In addition, the Department of Labour would become aware of a pesticide poisoning if it was reported in terms of the Compensation for Occupational Injuries and Diseases Act (COIDA).[9]

In South Africa, agrichemical pesticide poisoning is listed as a notifiable condition in the Health Act,[10] superceded by the National Health Act.[11] It is a legal requirement that the attending health care professional, whether clinician or nurse, working at the public or private health facility at which someone presents with a notifiable medical condition (for instance an agricultural pesticide poisoning) reports each case to the local public health authority on the prescribed GW 17/5 form. Local health authorities are then responsible for the analysis and investigation of each notified case, as well as responding appropriately. They must inform the particular provincial health department, which in turn informs the national health department on a monthly basis for surveillance purposes.



Example of good chemical store – labelled, separate sections.

Study aim

This article reports on the findings of a study by Tattersall[6] on reported cases of agri-chemical poisonings on farms in the Boland District of the Western Cape between 1997 and 2000. The study aimed to determine: the procedure for reporting and follow-up of cases of agricultural pesticide poisonings; which factors contributed to the poisoning cases, and whether a biological monitoring programme was in place at the time.[6]

" ... the follow-up system at the local level between local government officials and the farmers was not efficient for the prevention of agri-chemical poisonings."

Study design

A retrospective descriptive survey study design was applied, based on a record review.

Study setting

The study area covered a radius of 100 kilometres and included the District Councils of the Winelands, Overberg and Breede River in the Western Cape Province. Most farms in the study area produce wine and fruit for export purposes. Each farm has a dedicated team of chemical handlers who are responsible for preparing and applying agricultural pesticides to crops under the direction of management.

Population and sampling strategy

The population consisted of agricultural chemical poisoning cases notified to the local health authorities in the study area during the period 01 January 1997 to 31 December 2000. No sampling was conducted since all records of such cases during the four-year period were included in this study.

Data collection

Data was collected using a sheet specifically developed to capture data from two completed forms stored at the local health authority's office. The first was the GW17/5 form entitled 'Notification of medical condition' required in terms of Sections 32 and 47 (i) (b) of the Health Act, No. of 63 of 77.[10] This is the official national Department of Health form used to inform the department of cases of notifiable conditions, one of which is pesticide poisoning. The second was the local government's 'Epidemiology Investigation: Toxicology' form, used for investigating agricultural chemical poisonings.

Ethical approval

Ethical approval for the study was granted by the Research Committee of the Faculty of Applied

Sciences of the Cape Peninsula Technikon.

Results and discussion

There were 110 cases of agricultural poisoning notified from 01 January 1997 to 31 December 2000. Most of these cases (67%) occurred on wine and fruit farms.

As is common with pesticide poisonings on farms,[2,5] three patterns were found in this study. They were accidental poisonings of adults and children (25% in this case); self-inflicted injury among adults (21%) and occupational poisonings, seen as negligence, involving adult farm workers (38%). The rest of the cases in the study were unknown. Toddlers under ten years of age constituted 10% of cases.

Most of the poisonings (42%) occurred at home of which the majority were suicide attempts. A further 30% of the cases could be labelled occupational incidents and they occurred in the orchards, mostly during the spraying process.

Overall, details were missing on 91% of the notification forms. In addition, no forms had been completed in 14 (12.7%) of the cases. The department became aware of them when they were telephonically notified following post-mortems. Table 1 summarises general details related to the poisoning that were omitted from the forms.

It is important to note that in places this paper reports on the details that were missing from the records. It is necessary to interpret this with caution, as the fact that information was not supplied on a form cannot be construed as meaning that a particular action was not taken. Despite this, the absence of information is problematic since it can adversely affect surveillance and the capacity of the system to implement measures to prevent pesticide poisonings.

Reporting and follow-up of poisonings

Table 2 shows the reporting related details that were omitted on the forms. The GW 17/5 and the epidemiology forms were not properly completed in 12.7% and 84% of the cases respectively.

In general, there was very little information on what caused the poisoning of the notified cases and on the necessary feedback by the medical practitioner to ensure prevention of poisonings in future.

In only 16% of the cases was it indicated that some form of investigation was conducted by an investigating officer; in 90.9% of the cases it was not indicated whether the local authority reported the case on their weekly data sheet to be sent to the Department of Health. Furthermore, there was no evidence in 109 cases of the local authority (LA) having reported them to the Department of Labour. None of the forms contained a record of the incident having been reported in terms of COIDA.[8] London and Bailie explain that pesticide control activities have been integrated at national level through INDAC, a non-statutory interdepartmental governmental committee responsible for pesticide safety.[5] The committee theoretically co-ordinates surveillance data, however in practice it appears to attach most weight to the Department of Health data, which is frequently incomplete. This study has also illustrated the lack of completeness of data originating from local level and between departments, highlighting the need for departmental co-operation at local level.

In 90% of the cases there was no information to confirm that the DoH gave feedback to the doctor/nurse on how to prevent these cases. It was found that there was no proper system of control (checking system) to verify whether recommendations were employed or not.

This study showed that the follow up system at the

Table 1. General information relating to the poisoning (N = 110 cases)

Items	Information	Omitted information n (%)
Details of poisoned individual	Age	9 (8.2)
	Gender	3 (2.7)
	Substance use (abuse)	98 (89.2)
Agricultural chemical details	Agricultural chemical use	19 (7.3)
	Origin of agricultural chemical	13 (11.8)
Individual poisoned	Chemical handler or not	31 (28.2)
Clinical details	Who reported the incident	20 (18.2)
	Symptoms presented by poison	1 (0.9)
Cause of poisoning	Cause of poisoning	5 (4.7)

Table 2. Information relating to the reporting and follow-up of the poisoning (N = 110 cases)

Items	Information	Omitted information n (%)
Reporting of poisoning	Time elapsed before issue of report	12 (10.9)
	GW17/5 completed	14 (12.7)
	Confirmation of Local Authority's inclusion in weekly summary	100 (90.9)
	Employer reported in terms of COIDA	110 (100)
	Feed back by medical practitioner	92 (83.6)
	Local authority reported to the Department of Labour	109 (99.1)
Recommendations made	Recommendations made	20 (18.2)

" ... legislation ... was applied in a fragmentary manner."

local level between local government officials and the farmers was not efficient for the prevention of agri-chemical poisonings. In 39% of the reported cases the incident was investigated more than one month after the incident. The legal requirement is that cases are followed up within one month after it occurred. In 25% of the cases, the farmers did not sign to indicate that they were aware of the investigation taking place on their farm. It was further indicated that 16% of the farms had previous incidents of poisonings notified. This may indicate a repetitive pattern on some farms that could have been prevented if there had been a more stringent follow-up system in place.

The local authorities are legally required to follow up cases of poisoning to prevent a repeat of the poisoning on the farm. However, in 82% of the cases no recommendations were made by the investigating officers. In the cases where recommendations were made, they centered around training of the agri-chemical handlers to use pesticides safely; the proper use and maintenance of personal protective equipment (PPE); and the safe use and control of agri-chemicals generally.

Recommendations by investigating officers should legally be followed up by farm managers. However, the study found that no control measures were in place to ensure implementation of these recommendations. This is of concern as the health inspectors of a local authority remain the key health care promoters in their area of jurisdiction. Their vigilance and follow-up of notified cases, rapport with the farming community, and liaison with general practitioners can play an invaluable role in improving awareness and preventing future poisoning incidents.

In summary it can be said that the poisoning cases that were reported were poorly reported and it is unclear whether these cases were properly followed up by the local authority or whether the information led to any changes and follow-up action on the specific farm in question. The incompleteness of information on reported cases together with the fact that many cases are not reported is an untenable situation.

The Tattersall findings confirm previous findings by London *et al* [4] in a study conducted in 1994. London *et al* analysed data on notifications of pesticide poisonings in the Western Cape for the period between 1987 and

Table 3. Information relating to the factors contributing to the poisoning (N = 110 cases)

Items	Information	Omitted information n (%)
Training	Trained in safe use	44 (40)
	Informal training	42 (38.2)
	Formal training in days	72 (65.5)
Description of the poisoning	Stage of handling process	8 (7.3)
	Location of poisoning	7 (6.4)
	PPE available	25 (22.5)
	P.P.E. used	26 (23.6)
	How did poison enter body	11 (10)
Control and management	Adequate ventilation	101 (91.8)
	Stores locked	26 (23.6)
	Procedure for disposal of empty containers	30 (27.3)
	Are keys controlled	26 (23.6)
	Running water within 50 metres	26 (23.6)
Biological monitoring	Is there a programme in place	14 (12.7)

1991. In a concurrent review of hospital admissions for 1991 it was found that 78% of the cases of poisoning were not notified.[4] Furthermore, London and Bailie point out that a serious problem with the pesticide surveillance system is that too much data is required to be collected, noting that the toxicological investigation form used by local environmental health officers has over 50 variables for completion, few of which are used for reviewing public health action.[5] This may well have been a reason for the incompleteness of information in the records reviewed in this study.

Agricultural chemical poisonings: Contributory factors

The main factors that contributed to agri-chemical poisonings in the Tattersall study and which are discussed hereafter centered around the following aspects:

- insufficient information and training of the farm workers;
- the incorrect use of personal protective equipment;
- the lack of safety of the agri-chemical store; and
- the absence of a monitoring system on the majority of farms.

Table 3 indicates the data related to the factors contributing to the poisoning that were missing from the forms.

Example of poor chemical store.

Training in the safe use of pesticides

According to OHSA[7] the employer is responsible for the training of the farm workers to implement and maintain safe working practices on farms. There was no record in 40% of the cases that the chemical handlers had received the necessary training to use pesticides safely. Furthermore, details on formal and informal training were absent on many records. It is possible that this reflects a similar situation to that found by London and Rother,[1] namely that workers did not receive formal agricultural chemical handling training to equip them to prevent poisonings on farms.

Use of personal protective equipment (PPE)

Information filled in on the required forms reflected that 77.5% of chemical handlers had access to the necessary PPE, but whether this was utilised appropriately is not known. However, it does seem likely that this was not so in at least some of the cases as recommendations by health officers conducting follow-ups indicated that there were problems with the suitability, maintenance and training in the use of PPE.

Safety of agrichemical stores

In 62% of the cases, the origin of the poison was the chemical store. This is a very disconcerting observation given that the OHSA[7] and other appropriate regulations provide legal requirements to ensure limited access and prescribed storage of agri-chemicals on farms.

The data showed that a third of the farms did not have a separate store room for pesticides. In cases where there were separate chemical stores, it was indicated that the room was locked at all times in 36% of the cases. Furthermore, it can be inferred from the data that there is insufficient control over access to the store room – in more than 40% of the cases nobody in particular was responsible for controlling the access to where pesticides are supposed to be kept.

In general, questions pertaining to training on how to use agri-chemicals on farms were poorly filled in.

Biological monitoring

According to the Hazardous Chemical Substances

" What seems to be needed is a more controlled system to ensure the reporting and follow-up of cases of agri-chemical poisonings."

Regulations[8] levels of agri-chemicals in workers exposed to pesticides in the workplace must be biologically monitored on an ongoing basis. It is a legal requirement for employers to establish a biological monitoring system in the workplace in order to manage the chemical exposure of chemical handlers.[12] For example, in the case of agricultural chemicals that are cholinesterase inhibitors, the enzyme cholinesterase should be measured in the red blood cells prior to exposure, half way through the spraying season, and again at the end of the spraying season. This provides a warning of problems so that exposure can be reduced. Many poisonings can be prevented in this way. Agri-chemicals used on farms in the study area were mostly cholinesterase inhibitors.

This research showed that in the majority of cases (86%) there was no biological monitoring system in place at the workplace. In a further 12.7% of the cases no information was given on the forms.

Conclusion and recommendations

Although the analysis is a reflection of reported cases only, the results nevertheless give some perspective on key problem areas that need to be addressed if a comprehensive system of safe use of agri-chemicals on farms is to be designed and implemented in future.

The reporting system is an important mechanism for preventing further poisonings. This study demonstrated that the relevant legislation, especially with regard to notification of agricultural chemical poisoning was applied in a fragmentary manner between the different levels of government departments and between different governmental departments. A similar situation existed in 1994, when London and Myers noted that the obstacles to agri-chemical safety were "…the multiplicity of laws relating to pesticides administered by different departments resulting in poor coordination; the failure of existing occupational health legislation to address the agricultural workplace adequately; the unavailability and incoordination of safety."[4]

From the above findings it is clear that South Africa still has a long way to go as far as the control and safe use of agri-chemicals is concerned, and that there has been little progress since the earlier studies reported in this paper. What seems to be needed is a more controlled system to ensure the reporting and follow-up of cases of agri-chemical poisonings. Closer contact between local government, health personnel and farmers on the one hand, and local to central government reporting on the other hand, also seems crucial for an efficient system to be established. London and Bailie have also strongly advocated the need for a better coordination system rather than depending upon a non-statutory body, co-ordinating committee.[5]

A plea is made for better coordination of the different aspects of the prevention of agri-chemical poisonings on farms. One of the main recommendations of the study was the call for the establishment a central, state-controlled body with a national coordination function to ensure that all legislation with regard to agricultural chemicals is applied in a consistent manner. This coordinating body should ideally be established within the National Department of Health.

Example of good chemical store – separate room with controlled access.

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