



ASSESSMENT OF HEALTH CARE PROVIDERS INJECTION PRACTICES IN DESSIE DISTRICT, NORTH-EASTERN ETHIOPIA: FACILITY BASED STUDY

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ABSTRACT

According to the recent WHO report, it is estimated that injection cause an estimated 8-16 million cases of hepatitis B, 2.4-4.5 million cases of hepatitis C virus and 80,000 to 160,000 cases of Human Immunodeficiency Virus (HIV) infections annually worldwide. In Ethiopia, only a handful of studies have attempted to examine the safety of medical injections and vaccinations at health facilities. Besides, such efforts focused mainly at health facilities owned and operated by the government. The aim of this study was to assess injection practices and perception of the providers towards injections in Dessie and Dessie Zuria Woredas. Institutional based cross sectional study was conducted from March to October 2007. For this study the government owned health facilities were surveyed. All hospital and four health centers were selected by purposive sampling methods. Standard survey instruments were adapted from the WHO safe injection global Network (SIGN) for the purpose of this study. From the health facilities study the information generated through the use of different survey instruments and approaches revealed that an alarmingly high proportion of the injections provided at the health facilities were potentially unsafe. Although at the time of observation all the injections were provided using disposable or auto-disable injection equipment, the safety of injection practices was largely compromised due to unsafe practices of handling needles before and after injection, such as failure of proper collection, storage and disposal of syringe/needles, as well as, failure of proper reconstitution of medical injections or vaccines. As a result, the majority of the injections were provided in a manner that predisposes the patient, the health worker or the community to risk of accidental-needle stick injuries. The widespread misuse of puncture proof sharp collection boxes (safety boxes) and inappropriate use of incinerators were among the behavior of health workers that need to be targeted for intervention. There was an established perception among health workers that injection medications were more powerful and effective than oral medications, and thus they believe that most patients prefer injections to oral medications. It is concluded that an extremely high proportion of injections are administered in a potentially unsafe manner. Lack of essential supplies in the health facilities, such as safety boxes, as well as, inadequate skill and attitude among health workers and other personnel are the major obstacles against provision of safe injections. Accordingly, these gaps should be bridged through sustained provision of the necessary supplies coupled with training programs that promote appropriate behaviors and attitude among personnel working in health care facilities.

Keywords: Injection, Injection Safety, practices, Dessie, Ethiopia

INTRODUCTION

Worldwide, injections are one of the most common medical procedures, with an estimated 12 thousand million injections administered each year. A large majority, more than 90 %, of these injections are administered for curative purposes. There is evidence that therapeutic injections have been overused for many years. The World Health Organization (WHO) Department of Essential Drugs and Medicine Policy proposed the proportion of outpatients who receive an injection for a health-care visit as indicator to monitor injection use in health care setting. Data indicated that in some developing countries, this proportion of prescriptions including at least an injection can reach 56 %. In addition, among injections administered for therapeutic purposes, between 70 % and 99 % were found to be unnecessary¹. A safe injection is one that does not harm the recipient, does not expose the health-care worker to any avoidable risks and does not result in any waste that is dangerous for the community. However, unsafe injections occur in many parts of the world and more particularly in developing countries, it has been estimated up to 50 % of injections are administered with syringes and needles re-used in the absence of sterilization. Transmission of blood borne pathogens, including hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) through unsafe injections has long been reported and causes a heavy burden of disease. It is estimated that annually, worldwide, unsafe injections

may account for 35 % of new HBV infections, 55 % of new HCV infections and 2 % of new HIV infections². To prevent transmission of blood borne pathogens that result from unsafe injections, injection safety must be achieved and injection overuse must be reduced. First, behaviors change needs to be promoted to move patients and health-care workers away from unsafe and unnecessary injections and toward oral medications. Second, a continuous supply of sufficient numbers of injection equipment must be available in health-care facilities to eliminate the reuse of syringes and needles in the absence of sterilization. Third, sharps waste management must be established to eliminate the risks of reuse of dirty needles and accidental needle-stick injuries³. The WHO strategy for the safe and appropriate use of injections worldwide has four objectives: (a) formulate national policies and plans for the safe and appropriate use of injections, (b) ensure quality and safety of injection equipment, (c) facilitate equitable access to injection equipment and (d) achieve appropriate, rational and cost-effective use of injections⁴. In many countries and cultures the belief in injections as a powerful means of restoring health is shared by health workers and lay people alike. The unnecessary and overuse of injections has prompted increasing concern among international agencies such as the WHO and national health officials and policy makers, as well as health workers. Although there is limited information on injection use and safety in Ethiopia, studies conducted so far (Haile and Jules, 2000) have revealed a high rate of medical injections, most of which

are potentially unsafe to the patient, the provider or to the community⁵. The Federal Ministry of Health (FMOH) in conjunction with Making Medical Injections Safer Project (MMIS) and other partners has been working in the realm of the national injection safety initiatives. With the concerted efforts of the federal MOH, Regional Health Bureaus (RHBs) and partner Civil Society Organizations (CSOs), the national initiative has taken leading steps in the development of guideline and national strategy for safe injection practice in Ethiopia. Though the informal health sectors have substantial share in the country's health service deliveries, the national program interventions disproportionately focus to formal health sector. Currently, empirical data is lacking regarding the prevalence of injection in the informal health sectors. The absence of this evidence based information; however, impedes policy makers and health managers from not taking concrete steps in formulating policy and strategic direction that are relevant to the informal health sectors.

A community based cross-sectional descriptive study, conducted in December 1994 in Bahir Dar District, Northwestern Ethiopia, found injection prevalence of 13 %, out of a total of 1380 households in the district. Diarrhea and fever were the major symptoms for which injection was received, and higher injection treatment rate was observed among children under five⁶. A study conducted in four districts of Oromia and SNNPR also indicated that over 90 % of the injections administered were provided in a manner that predisposes the patient, the health worker or the community to risk of accidental-needle stick injuries⁷. The present study was carried out to provide comprehensive data from assessment of injection practices in urban, semi-urban and rural settings encompassing varied socio-cultural scenarios with an overall aim of initiating an informed debate among various stakeholders and to an eventual formulation of locally relevant injection safety interventions. Therefore, this study focuses on injection practice in Dessie and Dessie Zuria Woreda health facilities and it is believed to contribute, together with other studies in other parts of the country, to the meager data on injection practice in Ethiopia. It is also believed that this study might indicate the extent of injection use in the district, together with the level of risky practices that may expose injection recipients, health personnel and the community to injection-associated problems.

Objectives

General Objective

To assess injection practices and perception of the providers towards Injections in Dessie and Dessie Zuria Woredas

Specific Objectives

- To estimate the extent of injection use as a route for administration of medications in Dessie and Dessie Zuria Woreda.
- To assess the perception of injections among providers in Dessie and Dessie Zuria Woredas.
- To determine the type and degree of improper and unsafe practices in Administration of injections,
- To identify major obstacles in the provision of safe and necessary injections by prescribers and providers,
- To determine whether the critical steps of an injection administration are executed according to recommended best practices,

MATERIALS AND METHODS

Study Design

This is an institutional based cross-sectional study of injection practice in Dessie and Dessie Zuria Woreda conducted from March to October 2007. The structured questionnaires, interview guide, structured observation guide and a tool to collect a retrospective data were prepared in such a way to address the general and specific objectives of the study.

Description of the Study Area

Dessie is a city and a woreda in North-Central Ethiopia. Located on Addis Ababa - Mekele high way in the Debub Wollo Zone of the Amhara region, this city has a latitude and longitude of 11°8 N 39° 38E. One of the largest cities in Ethiopia, and based on figures from the Central Statistical Agency (CSA) in 2005, this city has an estimated total population of 169,104; of whom, 86,167 were males and 82,937 were females. The woreda had an estimated area of 15.08 square kilometers, which gives Dessie a density of 11,213.79 people per square kilometer⁸. Dessie Zuria is one of the 105 woredas in the Amhara region of Ethiopia; located at the eastern edge of the Ethiopian highlands in the Dubub Wollo Zone. Based on figures published by the CSA in 2005, Dessie Zuria woreda has an estimated total population of 272,199, of whom 139,990 were males and 132,209 were females; 3,845 or 1.41 % of its population are urban dwellers, which is less than the zone average of 12.4 % with an estimated area at 1,105.86 square kilometers (CSA, 2005). The average health service coverage of both woredas is 85 %. During the survey time, the woredas had 1 regional hospital, 1 rural hospital, 7 health centers and 18 health posts.

Sampling Techniques

For this study the government owned health facilities were surveyed. All hospital and four health centers were selected by purposive sampling methods. The health posts and three health centers were excluded. The health officers, nurses and health assistants working in out-patient departments (OPDs) and injection rooms were included from the selected health facilities for the in-depth interview. Inpatient injection services were excluded from the study as the scope of the present 'rapid assessment' is limited to the outpatient medical injection and vaccination services. The pattern of prescriptions and patients records were reviewed after collecting all the outpatient prescription and records made at the health facilities in the past one year at hospitals and health centers. Prescriptions of insulin injection and intravenous medications including 40 % dextrose injections were excluded from the review. The sample size was also calculated according to a single proportion formula. We assumed a 22 % injection prevalence (taken from recently made study in Meskandistrict⁹) with 95 % C.I and standard derivation of + 5 %. Accordingly,

$$N = \frac{(1.96)^2 \cdot (0.22) \cdot (1-0.22)}{(0.05)^2}$$

$$N = 264$$

Considering the design effect which is 3

$$n = 264 \cdot 3 = 792$$

Taking 10% contingency

$$n = 792 + (792 \cdot 10\%) = 871$$

But rather than taking 871 as a total sample size, to make the data more reliable we include 250 samples from the hospital and 100 samples from each H.Cs. Hence, the total prescriptions included for the health facility based study became 900 and they were selected according to a systematic random sampling technique.

Data Collection and Management

Standard survey instruments were adapted from the WHO safe injection global Network (SIGN) for the purpose of this study. Six instruments were extracted mainly from tool A and C. The survey instruments were designed for the purposes listed below;

- Observation of injection provision,
- Observation of health care waste disposal facilities and practices,
- Review of prescription papers
- Interview with supervisor (head or delegate) of health care waste management,
- Interview with injection prescribers, and
- Interview with injection providers.

Using these check lists, necessary information were collected by the principal investigator.

Data Entry and Analysis

Epi-info 2002 were used for data entry, clean up and analysis of the quantitative data. The analysis includes checking errors and describing the collected data by charts, graphs and numerical summary measures a measures of association, in terms of independent and dependent variables.

All qualitative data collected from the in-depth interview, structured observation, and patient records were summarized and analyzed in logical sequences by selected thematic areas.

Variables

Independent variables are:

- Age
- Sex
- training
- Occupation

Dependent variables are:

- Sources of injection
- Type of injection
- Incidence of injection associated abscess
- Type of injection, which caused abscess
- Direct cost of injection
- Indirect cost of injection
- Preference of injection
- Perception of the providers towards injection safety
- Providers perception of therapeutic use behind injection

Ethical Consideration

Ethical clearance was obtained from School of Pharmacy, Addis Ababa University. In order to undertake the survey discussion was held with the woredas health offices and heads of health facilities, also oral or written consent was obtained from respondents.

Operational Definitions

Injection

Skin puncturing procedure performed with a syringe and needle to introduce a substance for prophylactic, curative or recreational purposes which can be given intra muscularly, intravenously, intradermally and sub cutaneously.

Injection Safety

A safe injection does not harm the recipient, does not expose the provider to any available risks and does not result in any waste that is dangerous for other people disposable equipment.

Auto-disable disputable syringes

Syringes modified to disable themselves automatically by the plunger blocking after single use.

Injection in the informal health sector

According to Cunningham, informal injection providers were local health practitioners with some or no formal training and who are not officially allowed to administer injections.

Formal health person

Health person who got the necessary education/training to give health service at the health facility level in which he/she is working

Informal health person

A person who gives health service without getting formal

Kebele

Administrative division comprising of a number of households under district

RESULTS

The survey for "Assesment of injection practice" covered six health facilities from both Dessie and Dessie Zuria Woreda. The health facilities include 1 Regional referral hospital, 1 rural hospital and 4 health centers. All health facilities are government owned.

Health Facilities Observation

A total of 34 injections, were observed from 6 health facilities, so as to assess injection practice. Health center accounted for 22 (64.71 %) of the injection observed, while 12 (35.29 %) of the observations were made at hospitals. Regarding the providers, 14 (41.16 %) was health assistants, 15 (44.12 %) clinical Nurses, 3 (8.8 %) junior nurses and 2 (5.92 %) midwives. In most of the health facilities, a dedicated working table or tray was used in the injection room. In some health facilities, however, the tables that were used to prepare injections were contaminated with blood and dirt and also used for other purposes. At the time of observation, all the facilities used either disposable or auto-disable syringes/needles. In about 55.6 % of the cases, the patients/clients brought their own (new) set of syringe and needle. About 77.8 % of the injections were given using a sterile syringe, whereas in the case of 22.2 % injections the needles were not sterile or not used in a sterile manner. In all cases the needle/syringe used for reconstitution of injection was sterile. In 77.8 % cases, vials of heat sensitive vaccines were kept between 2°C and 8°C. Reconstituted vaccines and other perishable medications left over from previous day were also observed. Among injections where breaking the top of glass ampoules was required, only 28.6 % cases was a clean barrier used to protect the fingers from injury. In all health facilities no recapping practice was seen during this observation. After injection administration, the collection and disposal facility of injection equipment and the surrounding of the health facilities were also observed. Almost all health facilities had sufficient puncture proof safety boxes in stock and in areas where injections are given. Also, in areas where injections were given, safety box were available and most of them would be taken to

disposal areas by cleaner but some of them stored in unsupervised fashion (Table 1).

Assessment of Health Care Waste Disposal

Health care waste disposal was assessed at each of the 6 health facilities through the observation of facilities and practices, and interview with heads or delegates of the respective health facility. Nurses and health officers were the most common respondents to the interview. In about 4 of the facilities heads of the respective health facilities were interviewed. The average daily number of outpatients was estimated to be 55 at health centers and 200 at hospitals. The average number of injections provided daily at each level of health facility was also estimated to range between 25 in health centers to 100 in hospitals. The Expanded Program of Immunization (EPI) and routine medical injections were the two main types of injections reported by the respondents. About 5 of health facilities reported to have, a medical staff trained in Health Care Waste (HCW) management during the preceding three years. The kind of training includes safe injection (66.7 %) and EPI (16.7 %). Cleaners (66.7 %) and sanitarians (33.3 %) were reported to be responsible for HCW management at various levels of facilities. Moreover, 83.3 % of such individuals reported having participated in training related to HCW management. Concerning vaccination against hepatitis B, there were no health personnel who were vaccinated against hepatitis B. Regarding separation of health care waste, it was reported that there is no separation or segregation of HCW in all health facilities. Needle- stick injuries have been reported in the preceding 12 months in one of the health facilities and no measures have been taken. Gloves were the most common protective equipment used by staff handling health care waste in most of the health facilities. About 83.3 % of the facilities also reported using puncture proof sharp containers for collection of sharp wastes. Majority of facilities had no specific area for storage of HCW and not secured. Open fire and incineration were reported as the common system used for treatment of health care waste in health facilities. Open dump and small burial were the major type of final disposal for health care waste, accounting for 4 and 2 of the facilities, respectively. Types of disposal facility for the disposal of the majority of sharps were also observed. Open burning on the ground was observed in 4 health facilities and incinerators in 2. Open burning of waste in a hole or an enclosure and incineration were the most common type of waste disposal used for disposal of the majority of sharps. Whereas, dumping of waste in unsupervised area or open-burning on ground were observed in about 2 of the health facilities (Figure 1).

Review of Prescriptions at Health Facilities

About 900 prescriptions were reviewed from the 6 health facilities on the review period covering 12 months, August 2006 to July 2007. The patient characteristics in the six health facilities are shown in Table 2.

From the total of 900 prescription in the 6 health facilities, in 158 (17.6 %) of them at least one injection was prescribed, of which 149 (94.30 %) contained only one type of injection. In 9 (5.70 %) cases, two types of injections were prescribed. The proportion of administered injection prescribed by age, sex and health facilities is shown in Table 3.

The proportions of injection were higher at health centers (21.5 %) than in hospitals (14.4 %). The three most common injection prescriptions, accounting for 80 % of all injections, were procaine penicillin (44 %), Diclofenac (30 %) and Benzanthin Penicillin (6 %). Gentamycin, Vitamin B complex, Adrenalin and anti- rabbis' vaccine together accounted for another 15 % of the injection prescriptions.

Key Informant Interview with Providers

An interview was also conducted with a total of 13 providers of injection in all the 6 facilities visited to assess their knowledge, perception and attitude related to injection practices. Seven of respondents were male and 6 were female. Eight of the key informants were nurses and the rest were health assistants by profession. The providers reported that on average each of them provides 18 injections per day. About one third of the providers replied that they had needle- stick injuries in the preceding 12 months period but none of them claimed to have received vaccination against hepatitis B infection. According to most of the providers patients commonly bring their own (new) syringes and needles. And, patients generally ask for new (sterile) injection equipment. In the providers' opinion, some of the diseases or symptoms for which injections (other than immunization) are most effective were pneumonia and other respiratory symptoms, tonsil, rheumatic pain, skin infections, TB and rabbis. Some of the factors considered to be promoting prescription of more injections included fast action, type of disease, patient preference and their compliance. Consequently, procaine penicillin, Diclofenac and Benzanthine Penicillin were the three commonest injection prescriptions mentioned by providers. The most frequently mentioned advantage of injections over oral medications was their fast action, as they are directly administered into the blood stream. Other advantages mentioned include good compliance and acceptance (2HP), good alternative to patients who are unable to take oral medications (6HP) and psychological treatment of patients (5HP). On the other hand, providers said that problems at injection site (7HP) such as abscess formation, paralysis and pain; higher cost of the injectable (3HP); and possibility of allergic reaction or anaphylactic shock (10 HP) are possible disadvantages of injections over oral medications. Regarding the cost, the injection providers estimated the average cost of a single injection medication to be birr 1.35; syringe and needle as birr 0.40; and that of procedure as birr 1.00. Nearly all the providers reported that only disposable or auto-disable syringes/needles are used in their respective health facilities. Used syringes and needles are burnt or incinerated or disposed in an open pit. All of the providers thought that they had sufficient injection equipment to implement the "one syringe and needle/ one injection" rule. Nearly all the providers also claimed to have sharp boxes in their respective injection rooms. Also all of them replied that they had sharps waste disposal facilities. Most providers thought that private clinics prescribe more number of injections compared to others. Moreover, nearly half of the providers thought that patient do get injections at home, which they think is mostly, given by health assistants or nurses. Only 5 of the 13 providers reported having participated in any training related to injection safety. The type of training included safe injection practices, use of safety boxes, and general EPI training including use of auto disable syringes. Assessment of the providers' view of what makes an injection unsafe revealed the use of unclean or unsterile syringe/needle, and wrong site, route or technique of injection administration to be the most important factors. The providers' response on what makes it difficult to carry out any of the critical steps required for safe injection provision indicated that 5HP of them had difficulty in washing hands using sterile syringe/needle 5HP and clean preparation of injection 7HP. Shortage of equipment and supplies, and lack of safe water supply were mentioned as the most common reasons. All injection providers were asked about specific diseases that may be transmitted through unsafe injections, all the three deadly disease, HIV, HBV and HCV, were mentioned by 8 providers, HIV and HBV were mentioned by 12 providers. All of them mentioned HIV. Also STIs, Tuberculosis, tetanus, abscesses and malaria were mentioned by some providers.

Table 1: Needles and syringes handling in the health facilities, Dessie and Dessie Zuria Woreda, August 2007

Variables	Health facilities	Measures
Safety boxes in stock	Dessie R Hospital	Sufficient*
	Boru Meda Hospital	Sufficient*
	Dessie Hc	Sufficient*
	Segnogebery Hc	Sufficient*
	Buanbuawuha Hc	Sufficient*
	Guguftu Hc	Sufficient*
Safety boxes in area of injection administration	Dessie R Hospital	100 %
	Boru Meda Hospital	100 %
	Dessie Hc	100 %
	Segnogebery Hc	100 %
	Buanbuawuha Hc	100 %
	GuguftuHc	100 %
Collection of injection equipment in safety box	Dessie R Hospital	100 %
	Boru Meda Hospital	50 %
	Dessie Hc	50 %
	Segnogebery Hc	100 %
	Buanbuawuha Hc	50 %
	GuguftuHc	75 %
Sharps in open containers	Dessie R Hospital	50 %
	Boru Meda Hospital	0 %
	Dessie Hc	50 %
	Segnogebery Hc	0 %
	Buanbuawuha Hc	50 %
	GuguftuHc	50 %

*Sufficient: those facilities had more than 20 safety box in stock

Table 2: Patient characteristics from Prescriptions Review, Dessie and Dessie Zuria Woreda, August, 2007

Variables	Categories	Frequency	Percent
Age (yrs)	0 -4	88	9.8
	5-15	140	15.6
	16-60	592	65.8
	above 60	80	8.9
Sex	Male	445	49.4
	Female	455	50.6
Health facility	Dessie R Hospital	250	27.8
	Boru Meda Hospital	250	27.8
	Dessie Hc	100	11.1
	Segnogebery Hc	100	11.1
	Buanbuawuha Hc	100	11.1
	Guguftu Hc	100	11.1

Table 3: Proportions of injections prescribed by Age, Sex and Health Facility, Dessie and Dessie Zuria Woreda, August, 2007

Variables	Categories	Frequency (%) of injections	No of patients	Adjusted OR (95 %CI)
Age (yrs)	0-4	9 (10.2)	88	1.00
	5-15	26 (18.6)	140	1.82 (0.77,4.40)
	16-60	105 (17.7)	592	1.73 (0.82, 3.81)
	above 60	18 (22.5)	80	2.20 (0.87, 5.65)
Sex	Male	73 (16.4 %)	445	1.00
	Female	85 (18.7 %)	455	1.14 (0.80, 1.62)
Health facility	Dessie R Hospital	45 (18.0 %)	250	1.00
	Boru Meda Hospital	27 (10.8 %)	250	0.60 (0.35, 1.03)
	Dessie Hc	18 (18 %)	100	1.00 (0.53,1.88)
	Segnogebery Hc	31 (31 %)	100	1.72 (1.00, 2.97)
	Buanbuawuha Hc	10 (10 %)	100	0.56 (0.25, 1.20)
	GuguftuHc	19 (19 %)	100	1.06 (0.56, 1.98)



Figure 1: Inappropriate use of an incinerator (a) and open dumping of health care Waste (b) in Dessie regional hospital, August, 2007

DISCUSSION

In this study, data were collected using a combination of interviews and structured observations. In this way we attempted to minimize reporting bias and the Hawthorne effect (observer-induced changes in practices)¹⁰. The present study mainly employed tool C, and to a limited extent tool A, of the WHO SIGN survey instruments¹¹. The standard instruments from tool C were slightly modified and adapted to the local context and logistics limits of the survey. Thus, a total of six instruments were developed and applied through both quantitative and qualitative methods for data collection. The instruments targeted health workers, that is, injection providers, and head of the respective health facilities for structured interview. In addition, structured checklists were used for observation of injection administration, health care waste disposal practices, inspection of facilities as well as for reviewing prescriptions. It is therefore, believed that the study design has enabled a comprehensive assessment of the injection practice as multiple approaches and methods of data collection have been employed.

Injection Practices

Ensuring availability of safe injection equipment and supplies is considered one of the main requirements for improvement of safe injection practices. The results of our study revealed that the FMOH and some specific health programme e.g. EPI distribute the supplies. Also these supplies are more likely to be available all of the time in immunization centers compared to therapeutic centers. In the present study most of the observed health – care providers used disposable needle and syringes for injection and used new syringes and needles for each injection. However, there were many cases where the recommended diluents were not used. These findings are consistent with the results of Hauri *et.al*, who reported that observation of injection conducted in Mongolia health care facilities showed that needles were left in the septum of the multi-dose medication vials to be reused in the subsequent reconstitutions¹². Therefore, unlike many countries in the developing countries, reuse of injection equipments was not a problem in the government owned health facilities of the district. The reuse of syringes and needles for different patients was not reported at all by nurses in Romania, while 4 % of them reported the reuse of syringes and needles on the same patient in an emergency¹³. In Indonesia the observed reuse of syringes and needles in 5 health centers in several regions was reported to be more than 50 % of the injections¹⁴. In sub-Saharan Africa, it was reported that 155-60 % of health care centers reused syringes and needles¹⁵. However, Hauri *et. al*. reported that the observed injection providers consistently used newly opened syringes and needles for all injections in Mongolia¹⁶. The proportion of patients who brought their own syringe/needle in the present study is comparable to what was reported by the Oromia 2002 Study⁷. The critical steps required for safe administration of injection have been interrupted in many cases due to failure to use of a sterile syringe/needle, lack of clean preparation, difficulty in washing hands, unsafe handling of multi dose vials and difficulty in proper storage of syringe and needles. The overall indicator for the safety of injection practices revealed that only less than 15.4 % of injections fulfill all the critical steps involved in the provision of safe injection. It is important to note that so many injections could be unsafe despite the use of sterile injection equipment. This situation leads to the indication that adequate supply of injection equipment alone may not be enough to guarantee safe injection provision. The proportion of unsafe injections estimated in the present study is comparable to what was documented in Sidama in 2004¹⁷. The 2000 national injection safety survey also reported that 22 % of the vaccination and 38 % of the therapeutic injection were given with non-sterile equipment¹⁸. In the study conducted Mosul city, Iraq the administration of unsafe injection were lead to iatrogenic sciatic nerve injuries²³.

Health Care Waste Management

Our study showed that syringes were not disposed of safely at all and most needles were not segregated before their final disposal, although puncture proof safety container boxes were available in stock and at the site of injection of all health facilities. Instead, sharps were left in open plastic containers exposing the injection provider or the patient to accidental needle-stick injury. We found that most waste management activities were by large unsafe as in most of the health-care facilities sharps were found lying around and not disposed of within proper containers in waste storage areas. These areas were also not secure enough to prevent the access of lay persons. The presence of used syringes and needles in health care facilities was reported in Senegal and Cote d'ivoire in 10 % and 70 % of the facilities¹⁹. In Mongolia, all health care facilities followed a national regulation recommending burning waste at an open site, in a drum or in a stove under supervision¹⁶. Waste incineration was reported in only 33.3 % of the health care facilities in our study. Open dumping or burning of waste on the ground are a common phenomena in most health facilities. The study in Sidama Zone also reported use of incinerators in 42.5 % of the health facilities which was greater than our study. In the same study, at 35 % of the health facilities, dirty syringes, needles and other sharps were observed to be disposed in ways that exposed the health workers or the community to accidental injuries. This is less than the 44.4 % facilities in our study that dump health care waste in unsupervised area or practice open burning on the ground¹⁷. In Dessie referral hospital contaminated syringes and needles were observed just near the incinerator. Failure of appropriate use of safety boxes was also observed in Boru Meda hospital where the top of the box is wide opened supposedly for ease of use. In almost all 6 HF's the safety boxes were placed under a table besides a plastic container, which was normally used for collecting non sharp wastes but commonly used for sharps too. Interestingly, syringes and needles were seen just around the incinerator throughout carelessly and also the reportedly disposed safety boxes could not be seen at the incinerator or other disposal site, lead us to the conclusion that the safety boxes were kept for other purposes after emptying the contents. Except the Dessie Referral Hospital, all of the health facilities had no strong fence separating the health facilities from the surroundings. Since the used syringes and needles are usually uncapped, they pose a potential hazard. They might expose the community to needle stick injuries, and they might also find their way to be reused in the community. Children might also expose to this potential hazard while trying to play with them. The various good performance of health care provider in the present study point out to the critical importance of a comprehensive training that addresses all steps involved in the safe preparation and administration of injections, as well as the management of sharps and other health care waste. In Romania, 91 % of health care providers had attended at least 1 training session on universal precautions for infection control, including safe injections practice which is comparable to our study¹³. In the current study, needle stick injuries were reported at 16.7 % of the health facilities in the 12 months prior to the study. However, this figure only indicates the proportion of health facilities where such injuries were brought to the attention of the heads or delegates interviewed. On the other hand, an interview with injection providers revealed a 30.8 % prevalence of needle stick injuries. In either case, the prevalence of needle stick injuries is too high and should be prevented. Such risk could be minimized through the provision of essential supplies alongside the promotion of safe practices, largely through training of health workers and other personnel.

Review of Prescriptions

Retrospective data, from the 6 government owned health facilities showed that about 17.6 % of patients who visited the health facilities

have received at least one injection, during their visit to those health facilities. There was also marked variation between Borumeda hospital (10.8 %) and Segnogebeha health centre (31 %). A comparison of the same indicator across the residence for which the Health Centre Serve (rural) revealed a remarkably higher proportion of injection prescription in Dessie Zuriaworeda. The prevalence of injection from the review of prescription (17.6 %) was lower than what was reported in Nigeria (37 %) and North-west Ethiopia (37 %), but higher than what was reported from Cambodia (2.4 %) ¹⁹⁻²¹. The three most common injection medications prescribed were procain penicillin, Diclofenal, and Benzathine penicillin. The same drugs were also the top three injection medications prescribed at the 16 health facilities in the 2002 Oromia Study⁷. Even if the injection prevalence rate documented in health facilities survey was lower than other countries, it is still higher than the standard set by the international network for the rational use of drugs (INRUD), which was set to be less than 5 %²².

CONCLUSION

There is a widespread perception among health workers that patients prefer injections over oral medications, and that they do ask for injections when they visit health facilities. Such perceptions may not always hold true, and in some cases they may be contrary to what patients would reply when inquired. Fast action, better compliance, and suitability to patients with vomiting are common rationale that guides the therapeutic rationale of providers. Along with the understanding of advantages of injections there is a need to promote awareness about the potential risks of unsafe injections. One out of every five prescriptions carries at least one injection medication. This proportion appears to be too high as most of the injection medications could be substituted with oral formulations. Gross inadequacies were evident in the practice of injection preparation and administration. Although part of the problem arises from lack of supplies such as sterile injection equipment, safety boxes, and appropriate HCW treatment and disposal facilities, improving the knowledge, skill and attitude of health workers should receive due attention. Availability of hand washing facilities and supply of sterile injection equipment were the two main perceived difficulties encountered in the critical steps needed for safe injection provision. The critical steps of an injection administration were repeatedly interrupted due to failure of safe preparation and administration of injections, as well as, lack of safe collection, storage and disposal of sharp wastes. Misuse or inappropriate use of puncture proof safety collection boxes (sharp boxes) was another unsafe practice widespread across all levels of health facilities and woredas. Opening the tops of safety boxes, supposedly for ease of use or for the purpose of emptying and reusing the boxes, could tremendously increase the risk of needle-stick injuries among personnel involved in the management of health care waste, who are often not targeted with the necessary training. In this connection, the use of plastic containers, for collection of sharps is another widespread practice that needs to be discouraged.

Recommendations

The findings showed that in order to reach to the desired goal of making every injection safe, key behavioral determinants and injection related practices that contribute for unsafe injection practice and are prevalent among providers, should be simultaneously and properly addressed. Based on the findings of the survey the following recommendations are forwarded for action.

- Provide the health facilities with adequate supplies of needles, syringes, and safety boxes etc. and ensure that all health facilities own and use appropriate medical waste disposal facilities like incinerators.

- Train all health workers at all levels including those working in public and private health facilities on rational use of drugs, safe injection practice and proper medical waste disposal.
- Train cleaners and others involved in the management of medical wastes on safety and safe medical waste disposal issues.
- Develop and/or adopt and distribute good prescribers' guides and other educational materials and distribute with adequate quantity to all health facilities.

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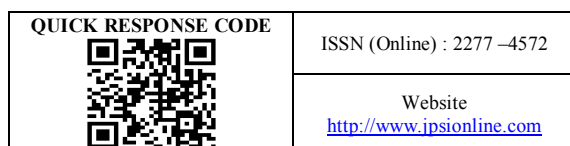
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