

Assessment of Injection Safety Practice in Health Care Settings: a Case from the Gambia

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Abstract

Unsafe injection practices transmit bloodborne pathogens on a large scale worldwide and thus the Ministry of Health was assisted in conducting an assessment of injection safety in the Gambia in 2021. Interviews and observation of injection practices in all of the public health facilities and a sample of private health facilities including NGO. A total of 81 health facilities had been involved. Sterilisation of injection material observed in 3 facilities (3.7%) for therapeutic injection. Vaccinations, used either AD syringe (83.7%) or disposable syringes (16.3%). Re-used injection equipment without sterilisation in facilities was 8.6%. Proportion of health facilities in lack of AD syringes is 6.3%. 87.3% of the health facilities the availability of AD syringes was over than 50 units. Lack of disposable syringes was 17.3% of the health facilities. In 46 health facilities (56.8%), the availability of disposable syringes was over 20 units. Lack of safety box in facilities was 50.6% (n=41). Needle stick injuries have been observed in 79.7% (n=74) of the health facilities. A proportion of 70.9% of vaccinators and 52.1% of curative injection providers reported experiencing at least one needle-stick injury. Lack of safety boxes and waste disposable facilities, unsafe behaviours and poor sharp waste management lead to unsafe injection practices in the Gambia, exposing patients, health care workers and community to bloodborne infections. A coordinated strategy, training of health workers, and encouraging of the proper disposal of sharp required to prevent injection-associated infections in the Gambia.

Keywords: AD syringes, Injection, Needles, Safety boxes.

Introduction

Injections are widely used worldwide and plays a pivotal role in medical treatment and despite its contribution to the field of medical treatment and prevention, the injection could also have a negative impact of causing risk of abscess at the site of injection, nerve paralysis, allergic reactions as well as the risk of blood-borne virus transmission to patients/clients, health service providers and the community [1, 2]. In developing countries, the estimated number of injections per person per year has

been estimated to be 3.4, ranging from 1.7 to 11.3, with unsafe injections representing 39% and ranging up to 75% [3]. Injections are not totally safe. Injection Safety in any immunization program forms a pivotal concern globally. WHO has reported that about 550 million injections are administered on yearly basis within the program of EPI in third-world countries [4] and due to this, great concerns regarding the dangers of poor sterilization and injection techniques have motivated EPI programs in many countries to re-examine injection safety practices [5]. An estimated 50%

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of injections administered in third-world countries are classified unsafe and as many as between 20 – 80% of cases of Hep B virus infection are caused by unsafe injection as stated by the World Health Organisation (WHO) [6, 7]. In the assessment of safe injection practices and needlestick injury among nursing students conducted at Mansoura University [8] revealed that, it is estimated that unsafe injection causes an annual basis 21 million of Hep B cases, 2 million Hep C and 260,000 HIV [9] while the mortality rate was 490,000 (Hep B); 240,000 (Hep C) and 210,000 (HIV) [8, 10]. According to the burden of these infections, Hep B and C account for millions of causes while an estimated quarter of a million causes of HIV infection annually [11].

WHO defines injection safety [12] as an injection given to an individual that does not harm or expose the health service provider to any risk or possess a risk for the community [13-15]. Safe Injection Global Network (SIGN) in partnership with WHO formulated intervention strategies to minimize the overuse of injections and provide safe injection administration as well as ensuring high level advocacy to reduce the risk of unsafe injections globally. The strategy was anchored in three core principles: behavioral change by health service providers and clients; uninterrupted supply of equipment and supplies; and lastly, proper waste management strategy [16].

Consequently, an injection safety assessment tool was developed by WHO called ‘WHO Tool – C’ [18] to assess countries’ injection safety in both public and private health sectors in Oman, Philippines, Seychelles, and Lao PDR [5]. An assessment study of safe injection practices and needle stick injury among nursing students at Mansoura University conducted by Samia Hassan Ibrahim et al, revealed that unsafe injection has gained prominence and is being practiced globally. It has been attributed to the major cause of disease transmission such as Hep B, Hep C, and HIV [8].

A study conducted in Swaziland by A.D, Daly et al, reported health workers carry the risk of using disposable syringes and needles through recapping and inadequate disposal as well as exposing the community to unacceptable risks from unsafe disposal of the injection material [5]. A study by Divya Sahu et al, revealed that worldwide estimates using mathematical modeling suggested unsafe injection accounts for 32% of new hepatitis B, 40% of new hepatitis C, and 5% of new HIV infections [19]. Another study conducted on staff nurses of Surat municipal area found about 50% of the nurses recapped needles after injections using both hands, which increases the risk of needle stick injury [1].

The Gambia is located in West Africa, bordering the North Atlantic Ocean and Senegal, and extends about 400 km inland, with a population density of 97 persons per square kilometer. The width of the country varies from 24 to 28 kilometers and has a land area of 10,689 square kilometers [20]. It is bordered on the North, South, and East by the Republic of Senegal and on the West by the Atlantic Ocean. The population is estimated at about 2 million according to the 2013 population and housing census. About 60% of the population lives in Urban and peri-urban areas, and women constitute 51% of the total population [20]. The crude birth rate is 46% per 1000 population while the total fertility rate is 6.04 birth per woman. There are eight Local Government Areas in the Gambia and out of which two are classified as Banjul and Kanifing, which constitute Greater Banjul. The remaining six LGAs undergo further demarcation into districts totaling 43 districts [20].

The assessment had the following objectives to address (1) To assess injection practices; (2) To assess the reported accidental needle-stick injuries among the health care workers; (3) To assess the disposal of used syringes and needles; (4) To assess the availability of sufficient quantities of injection material in the health facilities; and (5) To make

recommendations to ensure safety of injections in the Gambia. The Limitation of the assessment was the profile of investigators (all PHO) could have influenced the evaluation of the number of vaccinations found more elevated than that of the curative injections, what is in contradiction with what is usually observed elsewhere.

Methods

Study Design and Sampling Process

The type of study was a cross sectional observation study utilising a standardized questionnaire (staff interviews). The questionnaire consisted of three parts:

1. Observation of supplies and equipment.
2. Observation of injections (vaccinations and treatments).
3. Interviews with the injection providers and the clinic supervisor.

The proposed sampling unit is a health facility.

A convenience sampling of the health facilities followed and selected all the public health facilities of the country, and a random sampling of 10% of the private clinics (all located in the WD) and the out-reaches. Our sample was composed of: (1) 37 public health facilities; (2) 10 NGO; (3) 3 hospitals; (4) 19 privates health facilities; (5) 21 outreaches.

Data Collection

The supervisors and the interviewers have been trained two days and a pre-test to standardize the data collection was held in two health centres of Banjul. During the training and pre-test, the questionnaires were further reviewed by the consultant, the EPI staff, and

the participants (supervisors and interviewers). The data collection was carried out from April 6th, 2020, to April 15th, 2020. For the field work, there were 6 teams each consisting of a supervisor and 2 interviewers. If a health facility was unavailable, it could be replaced by a clinic from a list of alternative clinics.

Informed Consent

The purpose of the study has been explained to each health worker involved in the survey. They all gave their approval before the beginning of the investigation in each health facility.

Data Analysis

Data were entered in EPI info®. The proportions and the confidence intervals were calculated with EPI info. The denominator was the health centre where the observations have been done or where people answered the question. The observations of injection were analysed by health facility rather than by injection.

Results

A total of 81 questionnaires were collected (90%). Three clinics were replaced by alternative clinics, because of a refusal (1 case), 1 clinic (a pharmacy) doesn't give injections and in the third case the clinic had closed.

The survey teams observed 210 injections (86 vaccinations and 124 treatments). 151 injection providers have been observed. A number of 140 injection providers (60 vaccinators and 80 for curative) responded to the questionnaire and 100% (81) of supervisors responded to the questions.

Table 1. Number of Health Facilities involved in the Survey by Region

Division	Number	%
CRD	14	17.3
LRD	7	8.6
NBE	9	11.1
NBW	8	9.9
URD	11	13.6

WD	32	39.5
Total	81	100.0

Table 2. Health Facilities Assessed by Category

Type of facility	Number	%
Dispensary	13	16.0
Hospital	7	8.6
Major health centre	7	8.6
Minor health centre	13	16.0
NGO	8	9.9
Out -reaches	20	24.7
Private clinics	4	4.9
Pharmacy	9	11.1
Total	81	100.0

Table 3. Availability of AD Syringes

Number of syringes	Number of health facilities	%	CI* 95 %
None	4	6,3 %	1.8%-15.5%
≥ 50	55	87,3%	76.5%-94.4%
Cannot be assessed	4	6,3%	1.8%-15.5%
Total	63	100,0 %	

* Confidence interval

Table 4. Availability of Disposable Syringes

Number of syringes	Number of health facilities	%	CI 95%
None	14	17.3	9.8%-27.3%
1-4	8	9.9	4.4%-18.5%
5-9	4	4.9	1.4%-12.2%
10-20	4	4.9	1.4%-12.2%
≥ 20	46	56.8	45.3%-67.8%
Cannot be assessed	5	6.2	2.0%-13.8%
Total	81	100.0	-

Table 5. Availability of Safety Boxes in Stock

Number of box	Number of health facilities	%	CI 95%
None	41	50.6	39.3%-61.9%
1-4	21	25.9	16.8%-36.9%
5-9	4	4.9	1.4%-12.2%
10-20	6	7.4	2.8%-15.4%
≥ 20	7	8.6	3.5%-17.0%
Cannot be assessed	2	2.5	0.3%- 8.6%
Total	81	100.0	

Table 6. Number of Vaccinations and Therapeutic Injections per Health Facility/Week

	N=Health facilities	Mean/week	S D*	Range
Vaccination	58	397.3	624.4	20-4200
Curative	80	227.8	658.6	2-5000

* SD= standard deviation

Table 7. Accidental Needle Stick Injuries in the last 12 Months to the Injection Provider

	Yes (At least one stick)	Total	%	CI 95%	Mean	SD	Range
Vaccinator	39	55	70.9	56.9 – 81.9	1.8	2.1	1 - 10
Curative	38	73	52.1	40.1 – 63.7	1.04	1.3	0 - 5

Table 8. Methods of Sharp Waste Disposal

Type of disposal	Number of facilities	%	CI 95%
Open burning on the ground	14	17.3	9.8%-27.3%
Open burning in a hole or a closure	15	18.5	10.8%-28.7%
Incinerator	14	17.3	9.8%-27.3%
Burial	1	1.2	0.0%- 6.7%
Dumping in pit latrine or another secure pit	20	24.7	15.8%-35.5%
Dumping in an unsupervised area	5	6.2	2.0%-13.8%
Transport for off site	12	14.8	7.9%-24.4%
Total	81	100.0	-

Table 9. Injection Equipment

	Yes	Total	%	CI 95%
Health facilities with shortage of AD syringe	29	63*	46.1%	33.6 – 58.9
Health facilities with shortage of disposable syringe and needles	39	81	48.1%	37.1 – 59.5
Health facilities with shortage of safety boxes	52	81	64.2%	52.7 – 74.3
Health facilities receiving vaccines with safety boxes	10	61	16.4%	8.6 – 28.5
Health facilities receiving vaccines with injection material	45	60	75.0%	61.9 – 84.9

* 19 centres don't vaccinate

Table 10. Waste Policy and Training

	Yes	Total	%	CI 95%
Copy of the injection safety policy/recommendations issued by your health services	9	81	11.1	5.2% - 20. %
Copy of the safe sharps and healthcare waste disposal policy/recommendations issued by your health services	6	81	7.4	2.8% - 15.4%
AD syringes available for purchase in the community	2	60	3.3	0.4% - 11.5%
Disposables syringes and needles available for purchase in the community	32	80	40.0	29.2% - 51.6%

Patients provide their own injection equipment	-	-	-	-
For vaccination	1	60	1.7	0.0% - 8.9%
For curative	16	80	20.0	11.9% - 30.4%
Training on injection safety	-	-	-	-
Vaccinator	29	59	49.2	35.9% - 62.5%
Curative injection provider	49	80	61.3	49.7% - 71.9%

Table 11. Recovery of Waste

	Yes	Total	%	CI 95%
Presence of overflowing, pierced or open safety boxes	15	80	18.8	10.9% - 29.0%
Presence of sharps in an open container or other containers exposing to needle stick injuries	59	74	79.7	68.8% - 88.2%
Evidence of used sharps around the health centre and /or the disposal site	39	79	49.4	37.9% - 60.9%
Safety boxes waiting for disposal /incineration stored in unsupervised fashion	6	44	13.6	5.7% - 28.1%

Table 12. Knowledge of the Vaccinator on Bloodborne Diseases and Unsafe Injection Complications

	Yes	Total	%	CI 95%
AIDS/HIV	58	60	96.7	88.5% - 99.6%
HBV	35	60	58.3	44.9% - 70.9%
HCV	2	60	3.3	0.4% - 11.5%
Abscess	57	60	95.0	86.1% - 99.0%
Paralysis of the sciatic nerve	26	60	43.3	30.6% - 56.8%

Table 13. Knowledge of the Treatment Injection Providers on Bloodborne Diseases and Unsafe Injection Complications

	Yes	Total	%	CI 95%
AIDS/HIV	80	80	100.0	0.0% - 95.5%
HBV	39	80	48.8	37.4% - 60.2%
HCV	6	80	7.5	2.8% - 15.6%
Abscess	76	80	95.0	87.7% - 98.6%
Paralysis of the sciatic nerve	40	80	50.0	38.6% - 61.4%

Table 14. Persons Giving Injection by Category

Persons	Vaccination		Curative	
	Number	%	Number	%
Doctors	0	0.0	1	0.8
CNA	3	3.5	23	18.5
CHN	27	31.4	24	19.3
Pharmacist	0	0.0	3	2.4
SRN	5	5.8	33	26.6
SEN	9	10.5	28	22.6
Midwives	0	0.0	5	4.0
PHO	36	41.9	0	0.0

Volunteer	1	1.2	0	0.0
Others	5	5.8	7	5.6
Total	86	100.0	124	100.0

Table 15. Some Injection Practices in the Gambia

Injection Practices	Vaccination			Curative	No	%
	Yes	No	%	Yes		
Number of injections observed	86	-	-	124	-	-
Number of injection providers	64	-	-	87	-	-
Washing hand before injection	0	82	0.0	10	108	8.5
Special area for injection	73	13	84.9	97	27	78.2
Using AD syringe	72		83.7	-	-	-
Using sterilized syringe	0		0.0	3		3.7
Using disposable syringe	14		16.3	122		98.4
Using sterile syringe	86	0	100.0	106	17	93.8
Using sterile needle	86	0	100.0	110	13	89.43
Removal of needle from vial between injections	75	4	94.9	98	23	80.9
Vaccine store cool	64	4	94.1	-	-	-
Cleaning skin before injection	4	81	4.7	94	28	77.1
Swab = disinfectant swab 2	4			91		
Medications discarded at the end of the session	59	8	88.1	48	23	67.6
Re-capping the needle after the injection	18	68	20.9	73	49	59.8
Collection of AD or disposable in a puncture-proof container immediately after injection	26	60	30.2	36	86	29.5
Using of sterile syringe for reconstitution	5	75	6.3	80	16	83.3
Reconstitution with diluents from a single dose vial				27	52	34.2
Reconstitution with the correct volume from the same manufacturer	64	4	94.1			
Flushing				1	2	33.3

Discussion

Availability of Injection Equipment

For vaccinations, all clinics utilized AD or disposable materials. Sterilization of injection material was observed in 3 health centres (3.7%) for curative injection. In two cases sterilization was done by boiling, and in one case stream sterilization was done. The

proportion of health facilities in lack of AD syringes was 6.3% (4 health facilities). In 87.3% of the health facilities the availability of AD syringes was over than 50 units. The proportion of health facilities in lack of disposables syringes was 17.3% (14 health facilities). In 46 health facilities (56.8%), the availability of disposable syringes was over 20 units. The proportion of health facilities in lack

of safety box was 50.6% (41 health facilities). This findings collaborated with the findings for the study conducted in Swaziland [5] of which few of the facilities, the stock of needle was more than that of syringes. Regarding other facilities the reverse was true and in some cases the stock discrepancy reached as much as a 10-fold difference. The same study revealed that some respondents (24%) had run out of syringes and needles in the previous 6 months while four experienced stock outs that were due to insufficient delivery [5].

Disposable syringes were available for purchase in community in 32 health facilities (40%). In 20% of health facilities patient bring their injection material or curative injections and in 1.7% of facilities for vaccinations. According to supervisors of the health facilities, the proportion of facilities with a shortage of AD was 46.03%. The proportion of health facilities with a shortage of disposable syringes was 48.14%. The proportion of health facilities receiving vaccines with sufficient injection materiel was 75%. The proportion of health centres receiving vaccines with sufficient safety box was only 16.39%. With regards to supplies, the same study conducted in Swaziland [5], 25 facilities (93%) had sufficient stock of syringes and needles for at least 2 weeks. In all except for the two facilities, the number of needles in stock was inconsistent with the number of syringes.

Risk for the Health Care Worker

Needle stick injury has become a fundamental factor of poor injection safety practices by health care workers. In the study conducted in Mansoura University among nursing students [8], needles stick injuries was experienced at least once during their training at clinical setting as report by more than half of nursing students. Another study researcher found that 68.8% of the respondents had experienced needle stick injuries during their daily work [21] .

In this assessment the proportion of health care workers reporting at least one needle-stick injury in the previous year was 70.9% for vaccinators and 52.02% for curative injection providers. The mean number of stick injury was 1.8 for the vaccinator and 1.04 for the curative injection provider. Re-capping was observed after 20.9% of the vaccinations and after 59.8% of the curative's injections observed.

A cross-sectional study conducted in Chhattisgarh [19] collaborated that recapping of needle was done (33.1%) while that of a study conducted in Oman, indicated two-thirds recapping of any needles after performing phlebotomy was absent in 73% of Public and 38% private health facilities [8, 22].

Safety boxes were not routinely used both for vaccination and curative injections. The collection of disposable injection material in safety boxes was observed after 30.2% of vaccinations and 29.5% of therapeutic injections.

Risk for the Patient

Re-use of syringes and or needles without sterilization was observed in 7 health centres (8.6%). Unsafe practices such as changing the needle but not the syringe, using the same disposable needle and syringes many times for the same patient had been observed or in some cases, the disposable syringe and needle was given to the patient after the injection to come with the next time during the survey which contradicts the assessment conducted in Oman, which reported that syringes and needles for both treatment and vaccination were taken from a sterile packet in vaccination (96%); treatment (98%) and family planning (100% [22]. The same study revealed that using a clean barrier to protect fingers while opening glass ampoule was not a common practice and observed in 54% and 77% of public and private health facilities respectively [22].

There was a special area for 84.9% of vaccinations and 78.2% of curative injections. Observation of hand washing before injection

was done in 10 cases (8.5%) of curative injections. Using gloves was observed in two cases. The cleaning of the skin prior to injection was done before 77.1% of all therapeutic injections and 4.7% of vaccinations.

Using of dirty swab to clean the skin was observed in one case. Vaccines were kept cool during 94.1% of vaccinations. Reconstitution of product with diluents from a single dose vial was seen in only 34.2% of curatives injections. physiologic serum fluid was commonly used. The reported mean number of injections per week in the health centre for vaccination exceeded the number for treatment. It was 397.3 for vaccinations and 227.8 for therapeutics' (table 6). The ratio of therapeutic / immunization injections is 0.57.

Risk for Community

The main disposal of waste was dumping in pit latrine (24.7%), open burning in a hole (18.5%) or open burning on the ground (17.3%). The proportion of health facilities with incinerator was 17.3% (14 health facilities) (table 8). In 49.4%, there was evidence of used sharps around the health centre and or the disposal site.

The presence of sharps in open containers or others exposing to needle stick injuries was observed 59 facilities (79.7%). Sharps have been observed in plastics bags, cardboard and lying on the ground (Table 11).

The findings of the assessment conducted [19], it was observed that two-thirds of the health facility did not perform proper disposal and it was inadequate to collaborate with the findings of this assessment.

Another study conducted in Oman have revealed that sharps containers that awaits final disposal were locked in secured places which varies from 50% in private facilities and 72% in public facilities [22]. The same study revealed open container for sharps disposal was observed in 26% and 44% of Public and private health facilities respectively [22].

Knowledge of Healthcare Workers about the Consequences of Unsafe Injections

The main consequences of unsafe injections reported by health care workers were HIV /AIDS (96.7-100%), hepatitis B (48.8-58.3%) and abscess (95%) (Tables 12 and 13).

Policy and Training

According to supervisors, copy of injection safety policy was available in 11.1% and copy of waste disposal policy in 7.4% (Table 15). Vaccinators reported having training on injection safety in 49.2% and curative injection providers in 61.3%.

Conclusion

In conclusion, the insufficiency of disposable syringes and needles in the health facilities where in, 17.3% of the surveyed health facilities did not have any disposable syringe at the time of the investigation; health facilities lack sure means of waste disposal. Only 17.3% of the health facilities had incinerators; availability of safety boxes in the health facilities is weak (50.6% did not have any safety box at the time of the survey; Injections continue to be practised with nonsterile material. Indeed, in 8.6% of the health facilities, injections with nonsterile syringes or needles failed to be done; Accidental needle stick injuries of the health care workers were frequent. Indeed, 70.9% of the curative injection providers reported accidental punctures in the last 12 months. Re-capping of the needles after injection was particularly frequent, and the absence of injection safety and waste disposal policy.

The Main Problems identified at the End of this Survey

1. The absence of injection safety and waste disposal policy.
2. The insufficiency of disposable syringes and needles in the health facilities. Indeed, 17.3% of the surveyed health facilities did

not have any disposable syringe at the time of the investigation.

3. The health facilities lack sure means of waste disposal. Only 17.3% of the health facilities had incinerators.
4. The availability of safety boxes in the health facilities is weak (50.6% did not have any safety box at the time of the survey).
5. Injections continue to be practised with nonsterile material. Indeed, in 8.6% of the health facilities, injections with nonsterile syringes or needles failed to be done.
6. Accidental needle stick injuries of the health care workers were frequent. Indeed, 70.9% of the curative injection providers reported accidental punctures in the last 12 months. Re-capping of the needles after injection was particularly frequent.

Recommendations

For the Government

1. To implement a national policy on the safety of injection.
2. To provide a strong political and financial support to injection safety activities.

For the EPI

1. To implement a plan of action for the improvement of the safety of EPI injection.
2. To purchase safe injection equipment in sufficient supplies
3. To ensure safe disposal of used injection equipment: a practical guideline should be developed for the disposal of used syringes and needles.

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4. To promote safe and appropriate use of injections among health workers and population by information, education and communication (IEC) activities.
5. To provide appropriate training for staff involved in the EPI at all levels
6. To institute monitoring and supervision procedures to ensure adequate supplies at all level and correct practices by health workers.

For Partners (WHO, UNICEF, ONG, Associations, Programs and Projects Working in the Field of Health, Private and Confessional Sector etc.)

1. To assist in the development of the injection safety and waste disposal policy.
2. To give all their support for the implementation of this policy.

Conflict of Interest

I do declare that there is no conflict of interest.

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