

SHORT COMMUNICATION

Magnitude and factors associated with injection site infections among underfives in a district hospital, northern Tanzania

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Abstract

Injections are among the major procedures in health care facilities which need to be handled under sterile conditions. Unsafe injections have been found to cause deaths due to its associated complications. The burden of injection site infections is unknown in Tanzania. This study was designed to determine the burden of injection site infections and factors associated to it among underfives in a district hospital, northern Tanzania. This cross-sectional hospital-based study was conducted at Huruma Hospital in Rombo District, northern Tanzania from November to December 2013. This study included children of less than five years attending reproductive child health clinic for the routine immunization. Demographic data and clinical information were collected using pre-tested self-administered questionnaires, with both closed and open ended questions. A total of 200 underfives attending clinics for vaccination were recruited. Majority (n=125, 62.5%) were males. Out of 200 underfives, 60 (30%) were infants. Injection site infections were observed in 18 (9%, 95% CI: 5-12.9) of children; of whom 13 (72.2%) were females. Factors associated with injection site infections were female sex (OR 5.03, 95% CI; 1.58-18.71, P=0.001), severe malnutrition (OR 90, 95% CI; 9.5-398, p<0.001) and HIV infection (OR 21.5, 95% CI; 4.27-114.19, p<0.001). In conclusion, injection site infection rate is relatively high in this hospital and was associated with female sex, malnutrition and positive HIV status. Proper care and follow up should be instituted when injections are given to this high risk group of underfives.

Keywords: injection site infection, under-fives children, malnutrition, HIV, Tanzania

Injections are among the most common health care procedures requiring sterile conditions when administered. About 16 billion injections are administered each year in developing countries (Jodar *et al.*, 2001). Intramuscular injections which are mainly administered for immunization purposes account for an estimate of 12 billion injections annually throughout the world (Dann, 1969). Unsafe injections (administered under unsterile environment) cause about 13 million early deaths, loss of 26 million years of life and an annual burden of 535 million US dollars as direct medical cost (Gittens & Bunnell, 2009). Contaminated syringes, dirty skin and skin normal flora are the major factors that contribute to the burden of injection site infections (Pittet *et al.*, 2006; Gittens & Bunnell, 2009).

Skin preparation by rubbing with antiseptic such as 70% alcohol is one of the recommended procedure for sterilizations of the injection site (Hutin *et al.*, 2003; Gittens & Bunnell, 2009). However, over the past 30 years Safe Injection Global Network Research (SIGNR) has questioned the value of skin preparation prior to injections (Cocoman & Murray, 2007).

Most of the healthcare settings in Tanzania have developed policies and guidelines regarding the administration of injections which include or exclude skin cleansing, prior to the injection (Gumodoka *et al.*, 1996; Vos *et al.*, 1998). District hospitals in Tanzania serve as centre for primary health care which include vaccination of children. At Huruma district hospital in Rombo District, Tanzania, the guidelines regarding preparation of the skin before vaccination require swabbing of the injection site by 70% alcohol for 30 seconds prior to injection to reduce the risk of injection site infections. Regardless of the requirement, most of nurses do not comply with the good clinical practice due to limited resources. This study was designed to determine the burden

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of injection site infections and factors associated to it among underfives attending a District hospital, Tanzania.

This was descriptive cross sectional study conducted at Huruma District Designated Hospital in Rombo District of Northern-Tanzania. The hospital has a 300 bed capacity. The sample size was calculated using Kish Lisle formula of the cross-sectional study, the prevalence of 15% from the previous study (Peltola & Heinonen, 1986) was used. The minimum sample size obtained was 194 underfives. The study included children of less than five years attending reproductive child health (RCH) clinic for routine immunization. Only those received intramuscular injections were enrolled. Underfives who met inclusion criteria were serially enrolled until the sample size was reached. Demographic data and clinical information were collected using pre-tested self-administered questionnaires, with both closed and open ended questions.

Mothers/guardians of the enrolled children were asked regarding the outcome of the previous immunization injections, probe questions were used to establish the outcome. In all cases the injection sites were observed for the evidence of scars. In this study injection site infection was defined as development of abscess or pus discharge at the injection site following injection as reported by mother/guardians and evidenced by the large scar at the site. Nutritional status were measured as described by World Health Organization guidelines in which measurements of weight for length or height were interpreted using z- score for mild (-1SD), moderate (-2SD) and severe (-3SD) malnutrition.

The data were entered and cleaned using Microsoft Excel software and analysed by using STATA Version 11(Corp LP, USA). Age as continuous variable was described using mean \pm standard deviations. Categorical variables were described in proportions. Logistic regression was done to determine factors associated with injection site infections. The 95% confidence interval was used and a p value of less than 0.05 was considered as statistically significant.

The ethical approval to conduct this study was obtained from the joint Catholic University of Health and Allied Sciences/Bugando Medical Centre Research and Ethics Review Committee. Permission to conduct the study was obtained from Huruma Hospital management and all mothers/guardians were requested to sign informed consent.

A total of 200 underfives attending RCH clinic for intramuscular vaccine injection were recruited. Male underfives predominated the study population 125 (62.5%). Most of the children studied were below one year 60(30%) (Figure 1).

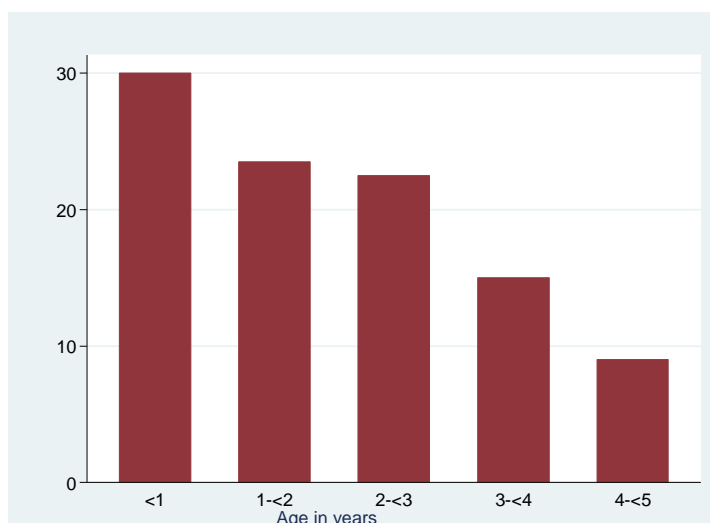


Figure 1: Age distribution of the study population

Out of 200 underfives, 17(8.5%) were severely malnourished while 102(51%) were moderate malnourished. Ten (5%) of the children were HIV positive. Injection site infection was observed in 9% (18/200) of the children. Severe malnourished children had significantly higher rate of injection

site infections (52.9%) than those with mild/normal nutrition status. Females were more likely to have injection site infections than males (17.3% vs. 4% $p=0.001$). Of the 10 children with positive HIV status, 6 (60%) developed injection site infections compared to 12/190 (6.3%) of those with negative HIV status ($p<0.001$). Although not statistically significant more children who were not swabbed (reported from mother/guardians) at the injection site were infected than children who were swabbed at the injection site (11.8% vs. 5.6% $p=0.124$) (Table 1).

Table 1: Factors associated with injection site infection

Variable	Response	Infection N(%)	OR (95%CI)	P-value
Age (week*)	-	39.4±15.1	1.02 (1-1.04)	0.547
Sex	Male (125)	5(4)	1	
	Female (75)	13(17.3)	5.03 (1.6-18.7)	0.001
Malnourish status	Mild (81)	1(1.2)	1	
	Moderate (102)	8(7.8)	6.8 (1.1-305)	0.04
	Severe (17)	9(52.9)	90 (9.5-398)	<0.001
HIV/AIDS	No (190)	12(6.3)	1	
	Yes(10)	6(60)	21.5 (4.3 114.2)	<0.001
Swabbing injection site	Yes (90)	5(5)	1	
	No (110)	13(11.8)	2.28 (0.72-8.47)	0.124
Kids start weaning	No (17)	1(5.9)	1	
	Yes (183)	17(9.3)	1.64 (0.2-72.7)	0.639

Injection site infections were found to be prevalent among children attending this district hospital in rural Tanzania. The observed prevalence is much higher than the previous findings among HIV infected children elsewhere in Tanzania (Vos *et al.*, 1998). The high infections observed in this study might be due to the remoteness of the study site where personal hygiene of the mothers, children and the environment are not at good standard. As previously reported (Cocoman & Murray, 2007), this study has proved that majority of immunization injections at rural area might be given without swabbing at the injection site, the practice which is recommended when the nurse maintains the required standard of hand washing between patients and asepsis during the procedure.

HIV infected children were at higher risk of getting injection site infections than uninfected children. These results are comparable with the findings from previous studies (Schmid *et al.*, 2004; Kermodé, 2004). The 21.5 times risk of getting infection among HIV infected children observed in this study calls for nurses to give more infection prevention control attention during injection. It was observed that that severely malnourished underfives were at higher risk of developing injection site infections than well-nourished children. This has been also reported in a recent study by (Ahmed *et al.*, 2017). Low immune status due to poor nutrition could explain these findings. It was also found that female children were more prone to injection site infections than male counterparts. These results do concur with the previous report of (Hope *et al.*, 2008). Further studies are required to explore the reasons for these findings.

The debate on whether or not to prepare the injection site by swabbing has been among health practitioners for several years. As previously noted by other studies (Hunter, 2008), children who were not swabbed at the injection site were more prone to develop injection site infections than children who were swabbed. This is due to the fact that swabbing with antiseptic at the injection site minimizes the risk of infection by reducing or completely removing the normal bacterial colonizing the skin (Gittens & Bunnell, 2009).

In conclusion, the injection site infections are relative high among children attending health care in a hospital in Tanzania. The injection site infections were associated with female sex, malnutrition and positive HIV status. In developing countries, proper care should be instituted when injections are given to immunocompromised underfives to reduce associated

morbidities. Further studies with a larger sample size are recommended to explore the magnitude and the predictors of injection site infections in rural areas in low-and-middle income countries.

Authors' contributions

CTM and SEM participated in the design of the work. CTM, MFM participated in the collection of clinical data. MMM, MFM and SEM analysed and interpreted the data. MFM, NM and SEM wrote the first draft of the manuscript. All authors read and approved the final version of the manuscript.

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Competing interest

All authors declare no competing interest.

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