

Exploration Of The Door To Needle Time Gap Of Administering Anti-Venom Serum (AVS) And Its Determinants: A Mixed-Method Study

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Abstract:-A mix method study was conducted at the Teaching hospital, Anuradhapura (THA) to describe the demographic characteristics of snake bites, determine the median time gap of administering anti-venom, identify reasons for delaying administration of anti-venom serum and propose measures to be adopted in order to shorten the door to needle time gap. Ethical approval was obtained by ethical committee, Faculty of Medicine, KDU. The descriptive cross-sectional part was based on snake bite victims elder than 16 years(n=50) who were admitted to the THA and received AVS (Anti-venom serum) therapy over a 3 ½ months period from 15th July 2019 and 50 victims were sample size for quantitative study. The data was collected through an interviewer administrated questionnaire .Participants were purposively recruited for the qualitative study and in-depth interviews were conducted with health care professionals in THA and peripheral hospitals. Qualitative data analyzed by thematic analysis with four themes including limited physical and human resources, issues in the diagnosis of envenoming, delays in preparation of AVS, reasons and delays in transferring patients from the local hospital to THA. Data were analyzed by using SPSS 23 with Mann-Whitney U test.

There were 88% (44) male and 12% (8) female victims. The most bites were not identified (50%) and most of the common bite were Russell's viper (46%).Below the ankle 82% and between 6 a.m. to 6 p.m. was the

commonest bite site and time. There were 40 (80%) indirect admissions and 10 (20%) direct admissions. Door to needle median gap of all direct and indirect admission was 125 (IQR= 65-158) minutes. Door to needle median gap in indirect admissions was 178 (IQR=90-210) minutes and direct admissions median gap was 72 (IQR=30-104) minutes. There was a significant difference between the median time gap of indirect and direct admissions. Poor rural hospital facilities, overcrowding, inadequate staffing and the unavailability of quality tubes for whole blood clotting time are the main factors contributing to the time gap. Final suggestions are increasing bed capacity and implementation of a triage system in the ETU.

Key Words - Snake envenoming, AVS therapy, Door to needle time gap (the time between admission to the Teaching Hospital Anuradhapura or Peripheral hospital to administration of AVS)

Background - Estimates suggest 4.5-5.4 million snakebites, 1.8-2.7 million envenoming and 81 000 to 138 000 deaths occur due to snakebites globally each year (WHO, 2019). In Sri Lanka, it is estimated that 80,000 bites, 30,000 envenoming and 400 deaths occur due to snakebite each year, much more than claimed by official statistics. Most of the cases are reported from the dry zone of the country (Ediriweera et al., 2016). Antivenom, the only specific treatment must be given without a delay for the snakebite patients.

Possible factors that could determine door-to-needle time gap (the time gap between the times of hospital admission to the end of AVS therapy) includes time taken to develop clinical features of systemic envenoming, time taken to become positive in ward CT (Clotting Time), delay in lab CT reports, time taken to prepare AVS (Anti-Venom Serum) and developing adverse reactions during AVS administration. In addition, patients are transferred to tertiary care units from peripheral units due to lack of facilities including heart monitors, AVS (anti-venom serum), trained nurses, doctors and emergency care facilities. The Teaching Hospital Anuradhapura is the largest tertiary care hospital in the Northern Central Province and also in the dry zone of Sri Lanka. Teaching Hospital Anuradhapura rats over 1000 snake bite patients annually. The majority of snakebite victims in the region seek western medical treatments and most of them enter the health care system as soon as possible. The purpose of this study is to determine the mean time between the time of admission to the hospital to end of the AVS (Anti-Venom Serum) therapy as well as to determine the preventable and non-preventable factors contributing to the mean door to needle time gap.

Objectives - To describe the demographic characteristics of snake bites, to determine the median time gap of administering anti-venom, reasons for delaying AVS administration and suggestions to be adopted in order to shorten the door to needle time gap.

Methods - This was a mix method study with two phases. The descriptive cross-sectional study was based on snakebite victims who were presented in THA (Teaching Hospital Anuradhapura) and received AVS therapy over a 3 ½ months period from 15th July 2019 and took these all admissions (50 admissions) as the quantitative sample size. And also Quantitative study design was interviewer administrate questioner. Qualitative study

was based on in-depth interview of health care professionals (medical officers, nurses, medical laboratory technicians who were experienced at least two years in snake bite management) and the health care assistants work at the THA as well as medical officers in peripheral hospitals (District Hospital Nochchiyagama, Rural Hospital Senapura, Peripheral Unit Mihinthle, Peripheral Unit Thalawa). Sampling method was purposive sampling technique. Qualitative data analysed using thematic analysis method and quantitative data analysed using SPSS 23 version. Ethical clearance for the study will be obtained from the Ethics review committee of the Faculty of Medicine, General Sir John Kotelawala Defence University. Participants will be recruited to the study after obtaining written permission by the respective Provincial Director of Health – North Central Province, Regional Director of Health, and Ethical board of the Teaching Hospital Anuradhapura. Written informed consent will be obtained from the recruited participants prior to commencement of the study. Confidentiality of all information and identities of participants will be strictly maintained and will not be disclosed when publishing the results of the study. Information sheet and consent form will be translated to Sinhala and Tamil to ensure that it's accessible to members

Results - Among the total 50 victims, 88% (44) were (>16 years) adult male and the 12% (6) were (>16 years) adult females. There were 23 (46%) Russell's viper bites, 1(2%) common cobra bite, 1 (2%) Indian Krait bite and 25 (50%) unidentified. Most victims had bites below the ankle (82%). 58% (29) bites were occurred during 6 am-6pm. Of all patients, 40 (80%) were indirect admissions and the rest were direct admissions to THA. There was no significant difference of median time durations after admission to the THA to the AVS administration in direct and indirect admissions. Door (Primary Care Hospital or

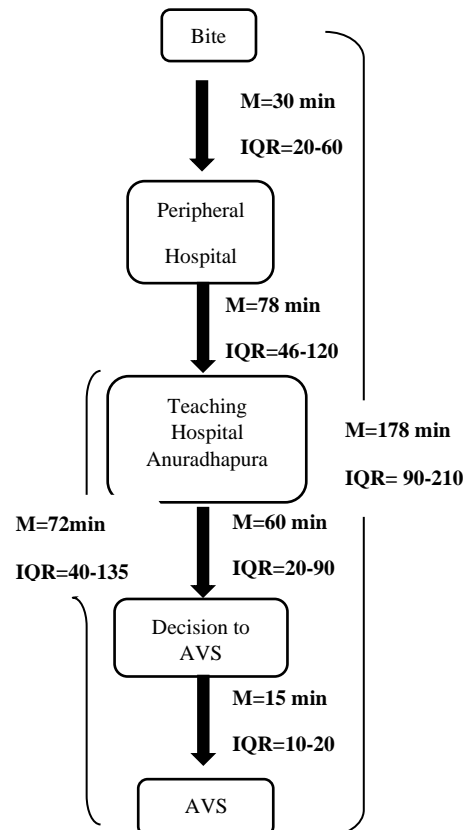
THA) to needle median time gap for all admission was 125 (IQR=65-158) minutes.

For indirect admissions door to needle median time gap was 178 (IQR=90-210) minutes. This included bite to door median time gap of 30 (IQR=20-60) minutes and door to THA admission median time gap of 78 (IQR=46-120) minutes. The median time gap between the THA admissions to AVS was 60 (IQR=20-90) minutes and AVS decision to needle time gap was 15 (IQR=10-20) minutes. The median time gap between THA admissions to needle was 72 (IQR=40-135) minutes. In direct admissions, the bite to door median time gap was 50 (IQR=24-63) minutes and the door to needle median time gap was 72 (IQR=30-104) minutes. The time gap between the admission to THA and the decision to give AVS was 60 (IQR=35-99) minutes and the median time gap between decision to give AVS and needle was 10 (IQR=5-18) minutes.

According to qualitative result, main factors such as poor rural hospital facilities, overcrowding, inadequate staffing and unavailability of quality tubes for whole blood clotting time contribute to increase total median time gap between door to needle. Most of the health care professionals made their suggestions with their experiences to improve health care environments to effectively manage snakebite victims. The limited and the lack of a triage system to handle the flow of admission to the ETU, were highlighted. Limited human resources such as the shortage of Medical Laboratory Technicians and health care assistants may contribute to the lengthening of diagnostic laboratory Clotting Time. In reducing the time wasted for diagnosing envenoming, possibility of replacing lab Clotting Time (which requires the service of the laboratory) with WBCT20 (Whole Blood Clotting Time 20) which a simple, bedside test is used, in the ETU by providing fresh and clean glass tubes.

Median = M Interquartile rate = IQR

Indirect admission (N=40)



Direct admission (N=10)

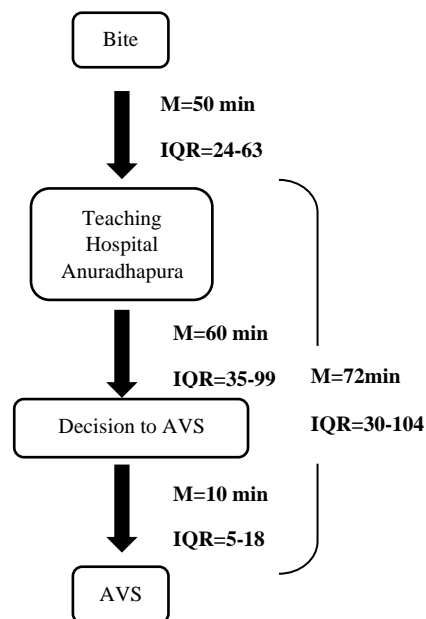


Figure 1 - Time gap of bite to AVS in direct admission versus indirect admissions

Conclusions – Median door to needle time gap for all admissions (All direct and indirect

admission) was 125 (IQR=65-158) minutes. Median door to needle time gap in indirect admissions was 178 (IQR=90-210) minutes and median door to needle time gap indirect admissions is 72 (40-135) minutes. Such median time gaps were obtained because of poor facilities of rural hospitals.

There was no significant median time gap between admission to THA at the time of onset of AVS among direct and indirect admissions. Overcrowding, inadequate staffing and unavailability of quality glass tubes for WBCT are the main factors contributing to door to needle time gap for all admissions (All direct and indirect admission).

Key Words - Snake envenoming, AVS therapy, Door to needle time gap (the time between admission to the Teaching Hospital

Anuradhapura or Peripheral hospital to administration of AVS)

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