

OPERATIONAL EFFICIENCY OF ANTI-RABIES CLINIC IN A TERTIARY CARE HOSPITAL, BENGALURU: A TIME AND MOTION STUDY

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Abstract

Background: Rabies is a neglected tropical disease, but preventable by vaccination. India is endemic to rabies, accounting to 36% of deaths globally. Despite rabies is 100% fatal, it is still not declared as a notifiable disease in India because of low awareness. Thus making the need of smooth functioning of Anti-rabies clinic crucial at health care setup. Operational efficiency in healthcare system refers to proper utilization of resources which can be determined by Time and Motion (TAM) studies. TAM study is used to determine the amount of time required for a specific activity or work function. Therefore, the present study was conducted to study the operational efficiency and also to find the time required for various activities at different service points in the Anti Rabies Clinic (ARC) at Victoria hospital, under BMCRI, Bengaluru. **Materials and Methods:** An Observational cross-sectional study was conducted during March and April, 2019 at ARC, using Simple Random sampling technique among Category III animal bite victims visiting ARC. A sample size of 216 was obtained, calculated based on a study conducted by Deepika et al(2017). A pretested semi structured questionnaire was used to record time and other information, and pre-synchronized stopwatches were used to record total activity time. Data was entered into MS Excel and analyzed using SPSS software v20.0. **Result:** The total median duration for ARC consultation was 63.5 minutes, with IQR 26 minutes. Of this, maximum median time i.e. 10 minutes was required for ARC OPD registration (history, health education & treatment) and post vaccination advice took comparatively less time (5minutes). **Conclusion:** Time management is a crucial part of health care, reducing waiting time can lead to improved treatment outcome, patient satisfaction and mortality.

INTRODUCTION

Rabies is a zoonotic disease caused by Lyssavirus which is a highly fatal affecting the central nervous system. This condition is globally prevalent causing a significant burden on public health. It is estimated that around 59,000 people die annually due to rabies worldwide, with Asia and Africa being the most affected regions.^[1]

Many countries have implemented Anti-Rabies Clinics to combat this deadly disease as a vital component of their public health infrastructure. These clinics play a crucial role in providing timely and effective treatment to individuals exposed to the rabies virus.^[2,3] However, the operational efficiency of such clinics is a critical factor in ensuring prompt care and optimizing resources.

Time and motion study is a managerial technique which integrates time study and motion study

designed by Frederick Winslow Taylor and Gilbreth couple respectively. This scientific approach was modified and widely accepted eventually to improve and upgrade work systems efficiently.^[4-6]

In recent years, there has been increasing recognition of the need for evidence-based approaches to assess and improve the operational efficiency of healthcare facilities. Time and motion studies have emerged as valuable tools for analyzing the various processes and tasks involved in the functioning of healthcare systems.^[7] By closely observing and documenting the time spent on each activity, these studies provide valuable insights into potential bottlenecks, inefficiencies, and areas for improvement.

In the context of anti-rabies clinics, ensuring operational efficiency is of utmost importance as delays or errors in treatment can have life-threatening consequences. Previous studies have primarily focused on the epidemiology, clinical management, and prevention of rabies; while relatively little attention has been given to evaluating the operational efficiency of anti-rabies clinics in tertiary care hospitals. Hence, there is a significant research gap in understanding the time and motion dynamics of these specialized facilities.^[8-10]

This research article aims to address this gap by conducting a comprehensive time and motion study of the operational efficiency of an anti-rabies clinic in a tertiary care hospital located in Bengaluru, India. As reported by the Bruhat Bengaluru MahanagaraPalike (BBMP), Bengaluru the capital city of Karnataka, has witnessed 42,818 cases in 2019, creating an urgent need to optimize the existing healthcare infrastructure for effective prevention and treatment.

The primary objective of this study is to quantify the time taken for each step of the patient journey in the anti-rabies clinic, including registration, consultation, vaccination, and follow-up visits. This study evaluates the operational efficiency of anti-rabies clinics through time and motion studies is essential for optimizing resources and improving patient outcomes.

Objectives: To determine the activity time at each service points in the Anti Rabies Clinic(ARC) at Victoria hospital, under BMCRI, Bengaluru.

MATERIALS AND METHODS

Study Design: This observational cross-sectional study was conducted at the Anti Rabies Clinic under Department of Community Medicine, Bangalore Medical College and Research Institute, Bengaluru. ARC is attached to teaching hospital of BMCRI. The study was done for a period of 2 months between April-May 2019. The study composed two stage evaluation, a passive observation and a time and motion study.

Study Participants: The study participants included victims of animal bite with category III wounds attending Anti Rabies Clinic, Victoria Hospital for treatment.

Sampling method: Simple Random Sampling
Sample size: Sample size was calculated based on a study conducted by Deepika et al(2017), where mean duration was 61 + 7.5 minutes, a sample size of 216 was obtained,

Using formula, $n = Za^2\sigma^2/d^2$, where $Za = 1.96$, $\sigma = 7.5$ minutes, $d = 1$ minute.

d^2

Data Collection: A pretested semi structured questionnaire was used to record time and other information, and pre-synchronized stopwatches were used to record total activity time. After explaining the purpose of the study socio-demographic data was collected by interview method, time at section was noted using stop watches by interns posted to ARC. Informed written consent was obtained from each person included in the study.

Outline of Anti-Rabies Clinic at Vitoria hospital, Bengaluru is as shown below [Figure 1]. Activity and waiting period at each section was noted.

Data Analysis: Data collection was initiated after obtaining Institutional Ethical Committee. Data was entered into MS Excel 16.0 and analyzed using SPSS software v20.0. Time has been expressed as median (in minutes) and inter-quartile range (IQR) was calculated for each activity.

RESULTS

[Table 1] Sociodemographic details of animal bite victims. Out of 216 animal bite victims, around 133(61.6%) were adults and 83 (38.4%) were Paediatric cases who were under the age group of 16 years; with mean \pm SD of 38.57 + 15.01 years and 9.48 +4.36 years respectively.

[Table 2] Socio-Economic Status classification. According to BG Prasad classification (revised in 2019) majority of the participants belonged to class II (41.2%) followed by class I (27.8%) of the socio-economic status classification. [12]

[Table 3] Details of Animal bite. Out of 216 animal bite cases, almost 100 (46.2%) cases were referred from all parts of Bengaluru. Majority of the cases reported were of dog bite (92.6%), which was unprovoked bite(77.3%). Most of the animals were stray (85.7%), unimmunized (96.3%) and participants were not sure if the animal was rabid (47.2%).

[Table 4] Wound management. Majority of the animal bite victims did wound toileting i.e washing wound with soap under running water (88.9%). [13] In spite of physical treatment with soap, 37% of the animal bite victims had also reportedly applied irritants like turmeric (30.0%) and jack fruit sap (21.3%) before visiting health care setup.

[Table 5] Waiting time at different activity points. The above table shows waiting time at different activity points from entry to exit of Victoria hospital. Waiting time at registration, OPD consultation, billing, post-vaccination advice took a median timings of 5 minutes each varying inter-quartile range, 3 minutes and 1 minute waiting before and bill entry bill respectively.

[Table 6] Service Delivery time at different activity points. Service delivery at ARC OPD registration took about of median timings of 10 min which

included detailed history taking regarding the animal bite and explaining the fatality of disease, available treatment modalities. Other activities like registration at main OPD, vaccination administration and bill issuing, post vaccination advice took 3 and 5 minutes each respectively.

[Table 7] Time taken for waiting and activities. The above table reported total median time, total median waiting time and total median activity time of 63.5 minutes, 31 minutes and 32 minutes respectively.

Table 1: Sociodemographic details of animal bite victims

Gender wise distribution		N=216(%)		Mean + SD
	Male	Female	Total	in years
Paediatric	71(32.8)	12(5.6)	83(38.4%)	9.48 +4.36
Adults	80(37.0)	53(24.6)	133(61.6%)	38.57 + 15.01

Table 2: Socio-Economic Status classification

BG Prasad classification (Revised in 2019) [12]

Social class Revised	Revised for 2019 (in Rs./month)	N=216(%)
Class I	7008 and above	60(27.8)
Class II	3504 – 7007	89(41.2)
Class III	2012 – 3503	42(19.4)
Class IV	1051 – 2101	19(8.8)
Class V	1050 and below	6(2.8)

Table 3: Details of Animal bite

Variables	N= 216 (%)	
Type of biting animal	Dog	200 (92.6)
	Cat	8 (3.7)
	Monkey	8 (3.7)
Type of bite	Provoked	49 (22.7)
	Unprovoked	167 (77.3)
Type of Animal	Stray	185 (85.7)
	Pet	31 (14.3)
Immunization status of animal	Immunized	8 (3.7)
	Unimmunized	208 (96.3)
Suspected Rabid animal	Yes	28 (13.0)
	No	86 (39.8)
	Don't know	102 (47.2)

Table 4: Wound management

a. Wound toileting	N=216(%)	Variables	N (%)
YES	192 (88.9)	Immediately (<30 min)	69 (35.9)
		30 – 60 min	97 (50.5)
		1 -2 hours	18 (9.4)
		Next day	8 (4.2)
NO	24 (11.1)		
b. Application of irritants			
	N=216(%)	Variables	N (%)
YES	80 (37.0)	Turmeric	24 (30.0)
		Jack fruit sap	17 (21.3)
		Lime	15 (18.7)
		Leaf extract	12 (15.0)
		Calotropis	12 (15.0)
NO	136 (63.0)		

Table 5: Waiting time at different activity points

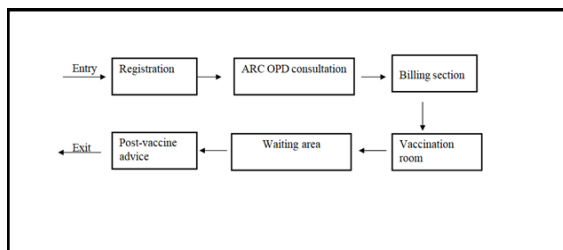
	Activity	Median time (in minutes)	Total waiting time (%)	IQR(Q3 – Q1)
i	At initial registration	5	20.8	5
ii	At ARC – OPD(H/O, wound toilet, health education)	5	20.8	6
iii	At billing section	5	20.8	5
iv	For entering Bill at ARC – OPD	1	4.3	5
v	Before Vaccine Administration	3	12.5	5
vi	Post Vaccination advice	5	20.8	1

Table 6: Service Delivery time at different activity points

	Activity	Median time(in minutes)	Total Activity time (%)	IQR(Q3- Q1)
i	Initial registration	3	11.5	3
ii	At ARC registration	10	38.4	5
iii	Issuing bill	5	19.5	3
iv	For Vaccination administration	3	11.5	5
v	Post Vaccination advice	5	19.3	1

Table 7: Time taken for waiting and activities

Variables	Median Time(in minutes)	IQR (in minutes)
Total median time	63.5	26
Total median waiting time	31	21
Total median activity time	32	17

**Figure 1: Outline of Anti-Rabies Clinic at Victoria hospital, Bengaluru**

DISCUSSION

The study was a facility based cross-sectional study was conducted to explore operational efficiency of Anti-Rabies Clinic at Victoria hospital, Bengaluru. Non value time spent by the animal bite victims comprised of waiting queue at the main registration counter, at the Anti-Rabies Clinic before consultation, at the billing counter and prior to Anti-Rabies vaccine administration. These delays at different activity points could be referred to high patient load at the main registration counter, lack of specific counter for Anti-Rabies Clinic for registration and billing.

A study by Chopade R et al,^[14] at a rural health training centre at Konkan region, mean timings reported at registration was 683.88 ± 25.7113 seconds and 675.52 ± 14.2601 seconds during consultation. Mean registration timings were almost similar to our study but consultation took much less time. This increase in activity time is attributed to detailed history taking about the biting animal, signs and symptoms of the victim.

Likewise a study by Rahim et al,^[15] mentioned each patient spent 66.64 minutes on average to avail OPD services, which complements with our study findings. In our study, the maximum mean time spent at OPDs were on Mondays and Thursdays, which gradually decreased on the other days of the week. Corresponding results were observed in studies conducted by Singh et al. and Aswar et al., where the maximum rush of patients was observed to be on Mondays.^[16,17]

Recommendation: By conducting an in-depth analysis of the time and motion dynamics, this study endeavors to identify potential areas for streamlining processes, reducing waiting times, and

improving overall operational efficiency. The findings will provide valuable insights for policymakers, healthcare administrators, and clinicians to implement evidence-based strategies for enhancing the effectiveness and accessibility of anti-rabies clinics in tertiary care hospitals.

This research article aims to contribute to the growing body of evidence on healthcare systems' operational efficiency and serve as a foundation for policy recommendations and future research in this critical area.

CONCLUSION

Time management is a crucial part of health care, reducing waiting time can lead to improved treatment outcome, patient satisfaction and mortality.

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