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A Study on Economic Impact to Post-Operative Suture Line Infection in Obstetrics Cases in a Tertiary Care Centre of Central India

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A B S T R A C T

Over staying in hospital due to postoperative suture line infection is burdening to every system, a well-known fact. The uniformly nonobligatory infection control policy frame work specially in developing nation like India, causes poor participation by administration to implement the proper infection control practice until the impact of postoperative infection burden is measured. Data of all suture line infection has been collected in desired format from the various departments of 1200 bedded hospital and subsequently data of obstetrics cases analyzed on cost estimated to nearest assumption for suture line infection. There is almost 8-12 times more economic burden on system in comparison to management of normal course uncomplicated case management. There is need of obligation to implement effective infection control practices uniformly in every health set ups.

Introduction

More than a century earlier, the concepts of antisepsis and infection prevention in surgical practices were realized. Surgery is a risk factor for acquisition of infection and nosocomial infections were found in 4.17% of patients in a surgical ward in India (Shah *et al.*, 2009). Surgical site infection (SSI) is the second most common infectious complication after urinary tract infection following Caesarean section delivery (Hillan, 1995). The risk factors predisposing patients to SSI are intrinsic and extrinsic. The intrinsic factors are patient related and the extrinsic factors are related to management and care. The risk they present in terms of infection is identifiable and manageable (Johnson *et al.*, 2006).

Majority of surgical site infections become apparent within 30 days of an operative procedure and most often between the 5th and 10th postoperative days (Renu Gur *et al.*, 2015). Surgical site infections delay recovery, prolong hospitalization or outpatient treatment, may necessitate readmission, increase hospital bills as well as other aspects of burden estimation ranging from morbidity, mortality, economical, consumables, resistance emergence, psychological,

emotional to family and social loss of different aspects (Smaill and Hofmeyr, 2002).

This institute has 1200 bedded hospital along with 5 more associated hospitals. There is almost 125 obstetrics beds availability in hospital for the cases and a new centre for 500 beds is due to commence for women and maternal health services. The hospital caters population of more than 10 million peoples of central India specially who are underprivileged. The state government provides the resources at discounted rates/ minimal cost and most of routine workups are free from the government. The infection control practices, their implementation; monitoring & surveillance are in primitive phase; just started in 2013. The bell had been ringed by faculty of dept. of Obstetrics and Gynecology in summer of 2017 during the meeting of infection control committee (unpublished), to which they were also members. There observation and concerns guided us to study the issue. Observation and reporting is essential to improve the quality of services and knowledge. This study is an observational study concerned to medical microbiological aspects of proper application of infection control practices.

Materials and Methods

The hospital has daily OPD of around 2500 with almost 40 admissions per day on average in the concerned department. The department has 2 operation theaters to perform 10-14 operations daily. As usual practice a case used to be discharged at 4^{th} post operation day and called for follow-up on 10^{th} post operation day. A case definition has been defined as any type of discharge seen on suture line post LSCS within 30 days of primary operation (Mangram *et al.,* 1999). A proforma has been drafted by incharge infection control committee to report all the cases described above. (Annexure) Data from April 2017 to January 2018 are being collected for the current scenario of post operated suture dehiscence on a proforma designed, as past records were not available (practices of reporting such events were not being exercised & recorded). Average daily expenditure by the government for management of usual inpatients has been calculated as per various services provided. It has been approximately calculated that Rs. 500 is being spent by government daily for an uncomplicated subject and for staying 2 family adults costs Rs. 500 daily in the city. The cost beared by government increases to Rs. 800 – Rs. 1200 daily whenever any complication appears. All the relevant data have been entered in Microsoft excel 2010 sheet for record & analysis purposes.

During the study no alteration in practices or modification in usual patient management had been done and the data were collected as routine surveillance exercise.

Results and Discussion

A total number of 57 cases reported in near 10 months of study period. Most of cases have 1-3 weeks of post op duration illness (Graph 1). The average age of all the enrolled ladies came to be 26.4 Yrs (Graph 3). The average duration of illness due to post operative infection came to be 20.01 days and average duration of total hospital stay was 24.39 days (Table 1). Total expenses of hospital in uncomplicated cases expected to be Rs. 1.14 Lakh (Table 1) for all 57 cases if were happen in normal case scenario and total expenses of patient's family in uncomplicated cases came to be Rs. 1.14 Lakh for all 57 cases (table 2). In infected cases the expenses of hospital estimated to came in approximate Rs.9,11,624 – 13,67,436 which is 8-12 times (Table 1), and total expenses of patient's family was approximate 5,69,765 rupees which is about 5 times the uninfected cases (Table 2).

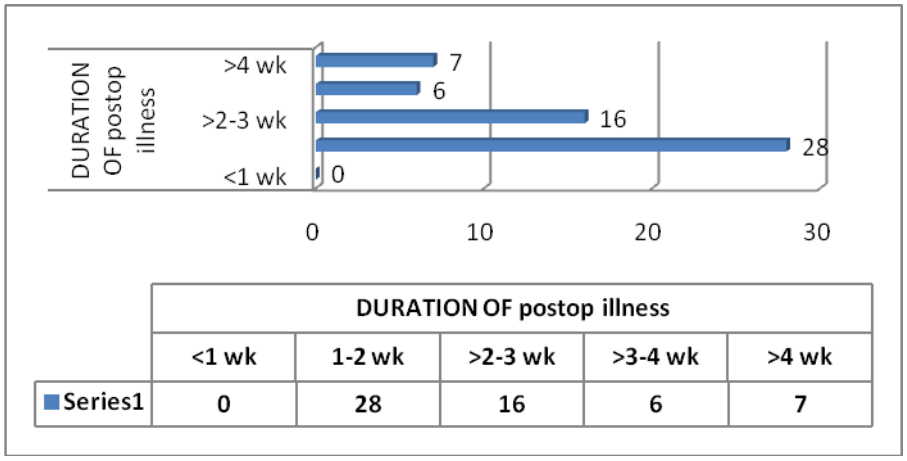
Table.1 Extra expenditure of public health care setup and burden on system due to post op infection and role of bacteria implicated

Bacteria	*Total no (studied)*	*postop illness (avg.Days)*	*Total stay (average days)*	*Extra expenses / patient (2 case scenario)*		*Bacteria specific expenditure (2 case scenario)*		*Total expenses in uncomplicated cases (duration of stay remains 4 days at normal system expenditure)*
				(@800/day)	(@1200/day)	(@800/day)	(@1200/day)	
S. aureus	11	15.96	20.55	16440	24660	180840	271260	
E. Coli	6	14.2	22	17600	26400	105600	158400	
Klebsiella	8	15.6	19.2	15360	23040	122880	184320	
P. aeruginosa	8	17	21	16800	25200	134400	201600	
Acinetobacter spp.	2	29	33	26400	39600	52800	79200	
Enterococcus spp.	1	38	40	32000	48000	32000	48000	
CONS	3	15	18	14400	21600	43200	64800	
Unidentified bacteria	14	15.35	21.42	17136	25704	239904	359856	
Total	**57**	**20.01**	**24.39**			**911624**	**1367436**	**114000**
Cost increase						**8.00 times**	**12.00 times**	**1.00**

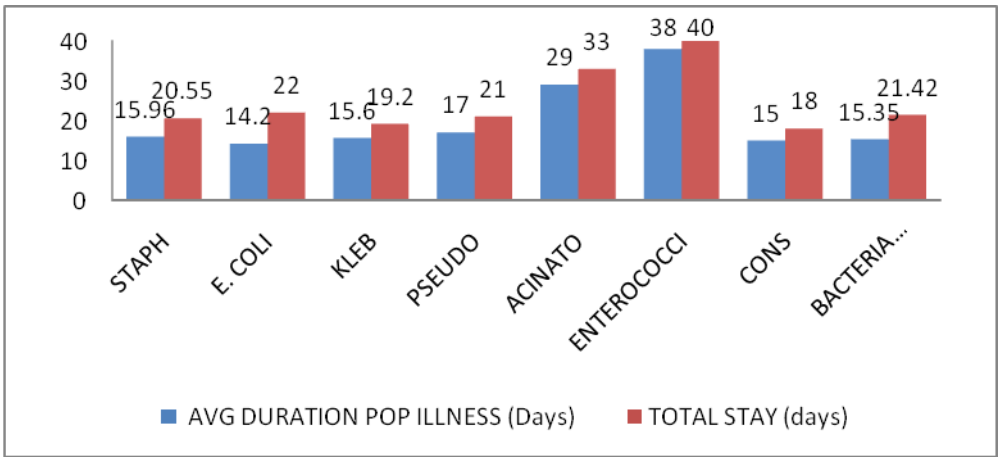
Table.2 Eextra financial burden on patient's family due to post op infection and impact of bacteria on extra cost

Bacteria involved	*Avg. duration of post op illness*	*Total stay*	*Total expenses/ pt. (@500/day)*	*Total expenses due to particular organism*	*Cost increase (times)*	*Total expenses in uncomplicated cases(Total stay 4 days for 57 studied cases) (@500/day)*
S. aureus	15.96	20.55	10275	113025	5.13	
E. Coli	14.2	22	11000	66000	5.5	
Klebsiella	15.6	19.2	9600	76800	4.8	
P. aeruginosa	17	21	10500	84000	5.25	
Acinetobacter spp.	29	33	16500	33000	8.25	
Enterococcus spp.	38	40	20000	20000	10	
CONS	15	18	9000	27000	4.5	
Unidentified bacteria	15.35	21.42	10710	149940	5.35	
Total	20.01	24.39		569765		114000
Cost increase (average)				**4.99 (5 Times)**		

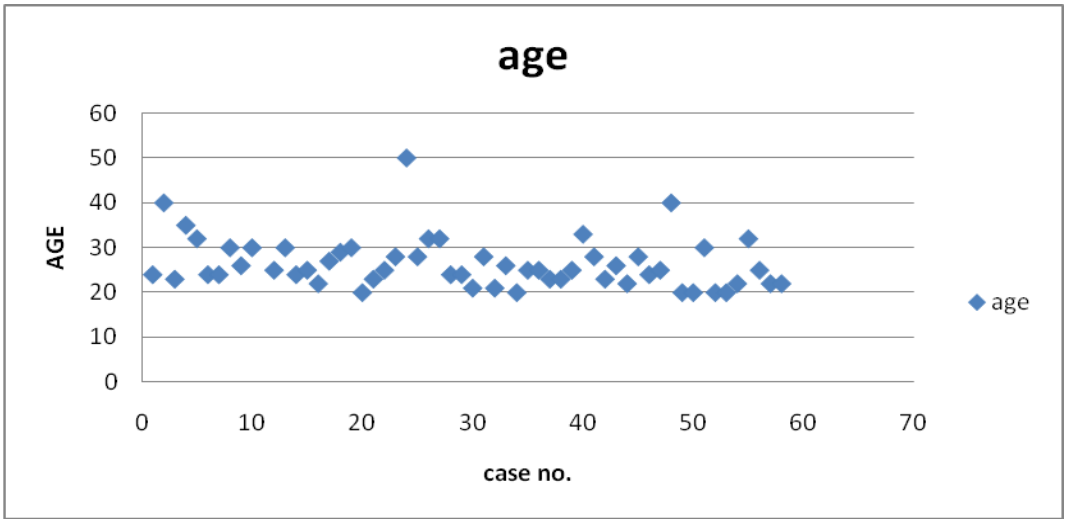
Graph.1 Duration of post-operative illness



Graph.2 Bacteria casing infection of post operation duration of illness and total stay in hospital



Graph.3 Distribution of cases according the age



Acinetobacter spp. and *Enterococcus spp*. of bacteria are more likely to cause more prolonged stay (graph 3) among all other bacteria in our health set up. *Acinetobacter* species and *Enterococcus* species infection leads to maximum economic burden (8.25 times and 10 times of normal case scenario respectively) to the family of affected lady (Table 2).

Developing nations have very poor data regarding impact of hospital acquired infection on society. By searching the internet Google search engine with title "economic burden estimation by nosocomial infection in India" we haven't got any relevant result. The policy or legal framework are not obligatory for public health care facilities, except going for NABH (Hospital Infection Control (HIC), 2015). Being non obligatory, the administration of health setup do not show dedicated commitment to implement the infection control practices. Though the state govt. provides incremental budgeting allocation year vies year, as our state govt. had given 4886.55 crore rupees in 2016-17 and 6262.69 crore rupees in 2017-18 (an increased by 28%) but the main concern area remaining the construction of infrastructure (http://www.finance.mp.gov.in/index.htm).

There is need to allocate separate budget to implement infection control practices in already established setups. Employing strict infection control policies by a functional infection control committee is the most important step in preventing SSI (World Health Organization, 2002). This committee should be able to monitor surveillance studies with a view to issuing guidelines to circumvent established risk factors. A successful surveillance program includes the use of epidemiologically-sound infection definitions and effective surveillance methods, stratification of SSI rates according to risk factors associated with SSI development, and data feedback. Surveillance is essential for recognizing nosocomial infection problems and for instituting effective preventive measures (Haley *et al.,* 1985; Shoji *et al.,* 1974).

The study shown that no age is escaped from infection and if young women age group got bed ridden for >1 week, it could have multiple aspects of loss to society (Smaill and Hofmeyr, 2002). Furthermore prolonged stay is now seen as bad parameter for good health care delivery. This also increases the antimicrobial resistance in bacteria among hospital and in community (Scott D. Holmberg, 1987) Curbing the emergence of resistance is an goal of our Global ACTION Plan on antimicrobial resistance by (WHO, 2015; United Nation, 2017) by antimicrobial resistance surveillance mechanism.

In countries like India were universal health coverage has not been implemented yet for all the major concern is of economic burden faced by family and in consequences by the govt. The burden could range from 8-12 times to the govt. for managing the same number of patients if no complications would have been. These results are in line with developed countries reports of increase in costs (Shepard *et al.,* 2013). In countries with low capita income an increase upto 5 times of usual expanse in short time; leads the family; mostly low socioeconomic into the debt.

Our study delineates the immediate action to be taken at govt. level to draft a policy in a legal framework so that the implementation of effective infection control practices is universally applied to control the burden to our citizen of nation.

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