

Biomedical equipment efficiency measurement and improvement of Nurse Call System

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ABSTRACT: In hospitals, 'bed call system' play a major role in patient care, because 30 % of patients in a hospital are either old aged or totally bed-ridden and need medical assistance. It is a mediator between the patients and the nursing staffs. Normally this system is very helpful in wards and ICUs. However, in the case of ICUs, 90% patients are in critical condition and cannot use this system. Moreover, in ICUs, staff to patient ratio is 1:1, but in wards the staff to patient ratio is 1:5. Over and above this every patient in a ward is separated by either curtains or partitions. This makes difficult for

nursing staff to access their patients on direct view. For such cases the nurse call bell system becomes very vital and valuable. If the call response is slow it will affect the patient satisfaction. Nurse call time improvement could also translate into monetary benefits because we may improve patient satisfaction and WOM will attract more patients, which will increase revenue for the hospital. This case study is one such example of Efficiency Measurement and Improvement of Nurse Call System at Zydus Hospital, Ahmedabad.

INTRODUCTION

Biomedical device technology is a discipline that needs extensive knowledge of biomedical device instrumentation. Required expertise covers device use, maintenance obligations, and ways to collect data on an extensive variety of tracking, medical, clinical, and surgical instrumentation. Those in the field also research and realise solutions to challenges found when working with physicians, nurses, and other technicians who use biomedical instrumentation. One such example is 'nurse call bell system'

Zydus hospital had installed an efficient 'call bell system' for the patients. Whenever the patient needed any assistant for nursing staff or attender, patients can generate the call by a single soft touch through the dedicated handset, which in turn will display in the main console, kept at the nursing station. Over and above that, every room entrance has a small lamp module for indication of call. Staff can identify the call immediately by the colour of light. Moreover, the nurse call has a 'code blue' option and it can be configured with both TV remote and telephone functionality. Within this system, all the calls are recorded, with date and time, to facilitate tracing of any call details whenever required. One can retrieve this data, analyse the root cause and take the corrective and preventive actions to improve the quality of performance. This process flow is explained in the figure 1.

In the last 3 months (November to January) the hospital was receiving patient complaints about prolongation of duration the nurse call is taking to be attended. Repetition of calls was because of non-resolved solutions of their queries effectively. Major part of calls is generated because of lack of patient education. Delayed nurse call average was 10 minutes. If this continued patient satisfaction index of hospital would have gone down which in turn had possibility of affecting the revenue.

The Operations head was concerned about this issue and wanted to take immediate measures to reduce the average time for attending a nurse call from an average of 10 minutes to 5 minutes by the end of the two month (June). For analysis his team started measuring the call bell data from February to June. The main parameters which were measured were:

- 1) Repeated Calls
- 2) Delayed Calls
- 3) Average response time of total bed call
- 4) Beds which generated maximum calls per day
- 5) Department which generate maximum delayed calls

For achieving this target, one need to reduce the delayed call percentage. As a first step towards this goal a meeting was arranged for the nursing staff, patient and their relatives where discussion and guidance, about the nurse call system operation and its use, was done. During the discussion with the staff members, it was recognizing that most of the patient and their relatives used the call bell system for needs other than the medical assistance. Few of the frequent nurse call queries broadly classified into clinical and nonclinical queries:

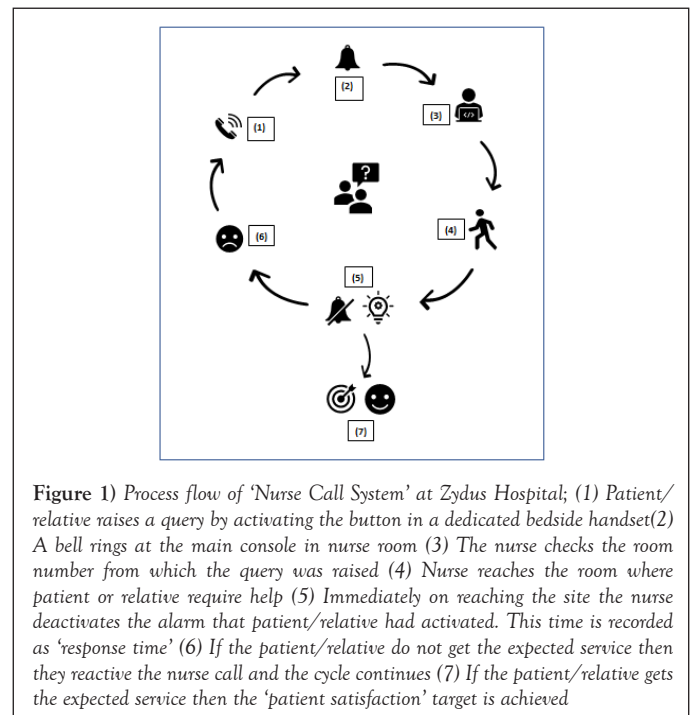


Figure 1 Process flow of 'Nurse Call System' at Zydus Hospital; (1) Patient/relative raises a query by activating the button in a dedicated bedside handset(2) A bell rings at the main console in nurse room (3) The nurse checks the room number from which the query was raised (4) Nurse reaches the room where patient or relative require help (5) Immediately on reaching the site the nurse deactivates the alarm that patient/relative had activated. This time is recorded as 'response time' (6) If the patient/relative do not get the expected service then they reactive the nurse call and the cycle continues (7) If the patient/relative gets the expected service then the 'patient satisfaction' target is achieved

Classification of Queries

- Clinical

Example: When will the doctor arrive? At what time will the treatment start? Iv fluid completed and want to disconnect IV fluid, What are my Investigation Reports? Have you given me my particular due medications?

- Non-Clinical

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KPI	Responsible	Benchmark
Average response time of total bed calls	Nursing In-charge and supervisor	Response time <1 minute
Repeated calls/beds	Duty nurses and attenders	<6 calls
Daily repeated calls	Nursing In-charge and Duty nurses	<45% of total bed calls
Delayed Call response time	Nursing In-charge and supervisor	Response time <3 minutes

1 w.Billing & TPA related queries.

Example: Is the Discharge Summary ready? When will Discharge file sent? How much time for discharge? Shall we (patient relatives) go down for billing? Am I eligible for Mediclaim?

2.F&B related queries.

Example: When will the food or water come? Complaint regarding food or tea

3.Attendant help calls.

Example: To Change Position of patient or bed,To open and fold relative’s sofa or change uniform of patient, Patient want to pass urine or stool

4.Patient and relative’s dissatisfaction start due to certain problems and these problems are connected to one after one service.

Example: Complaint about facilities like TV or AC

Few of the most common reasons for repeated call were: lack of timely solution as per expectation of patient, Anxiety of Relative, Absence of Patient & Relative education. Communication gap between Nurse, Patient and relatives.

After enlisting all these common queries and the reason behind the queries, a sincere analysis was done by operations team to come up with possible solutions for taking corrective and preventive actions. It was advised to improve the patient

nurse communication and sensitising the nurse supervisors and nursing in charges to sensitize with the matter and trained for proper patient education. Various other activities like assigning a floor manager to monitor the nursing , regular rounds by nurse call team and interaction with patients and nurses, along with Frequent

rounds by Nursing Supervisors, were implemented. Efforts were made to strengthen patient education in a structured way. An audit tool was introduced and tracked to check patient satisfaction with call bells. This tool is demonstrated in figure 2

S.No	Survey Question	Yes (1)	No (1)
1	Do staff respond timely to call bells?		
2	Does staff address your need for services in a timely manner?		
3	Were you educated about how and when to use call bells?		
4	Is the call bell placed within your easy reach?		
5	Are you satisfied with staff response to call bells?		

A checklist was introduced for Nursing and support staff. The example of one such checklist is shown in figure 3. Hourly check of the list is done by the allocated nurse for every patient and the nurse supervisor keep a track of it on daily basis.

No.	Checklist	Yes	No
1	Soothing environment for patient (AC, lighting etc)		
2	Ask patient for washroom (Pass stool or urine)		
3	Ask if patient wants clothing to be changed		
4	Patient position check for comfort of patient		
5	Check for medical utility (drugs , iv infusion etc)		
6	Ask patient for pain to remove discomfort if any		
7	Ask patient if require any utility near them (phone, water etc)		
8	Check for cleanliness of patient room and washroom		
9	Ask if extra pillow, blankets or towels required		

After successful application of all the corrective actions, analysis process was repeated to measure the relevance of the measures taken. Results of the analysis were found to be positive.

- Total bed calls were decreased by the avg. of 6.7%
- Cumulative reduction of over a period of 5 months (Feb to Jun) is 24.3%
- Avg. daily repeated calls were decreased by 9.5%
- Avg. monthly delayed calls were decreased by 29.8%
- Delayed call response time reduced to 5.2 Min from 10.1 Min A detailed result is displayed in the table 2

Description		February	March	April	May	June
Bed Call Parameter	Total monthly bed calls	29219	28409	25198	24358	22107
	Average daily bed calls	1043	916	839	785	736
	Average response time of total call	01:04 Min	01:02 Min	00:58 Min	00:57 Min	00:53 Min
Repeated call Bed Identification	Repeated call slab	6 Call	6 Call	6 Call	6 Call	6 Call
	Average daily repeated call	720	626	564	517	483
	Avg.% of repeated calls out of total bed call	69.03	68.34	67.22	65.86	65.62
Delayed call Department Identification	Avg. no of beds which generate max.repeated calls	60	55	49	44	41
	Delayed call time slab	5 Min	5 Min	5 Min	4 Min	4 Min
	Total number of Delayed call	181	123	95	150	98
No of Delayed call	Avg. response time of total delayed call	06:37 Min	06:31 Min	06:28 Min	05:24 Min	05:19 Min
	Dept. which generate max. delayed calls	11th AB Wing	11th AB Wing	11th AB Wing	11th AB Wing	8th B Wing
	No of Delayed call	58	37	24	30	21

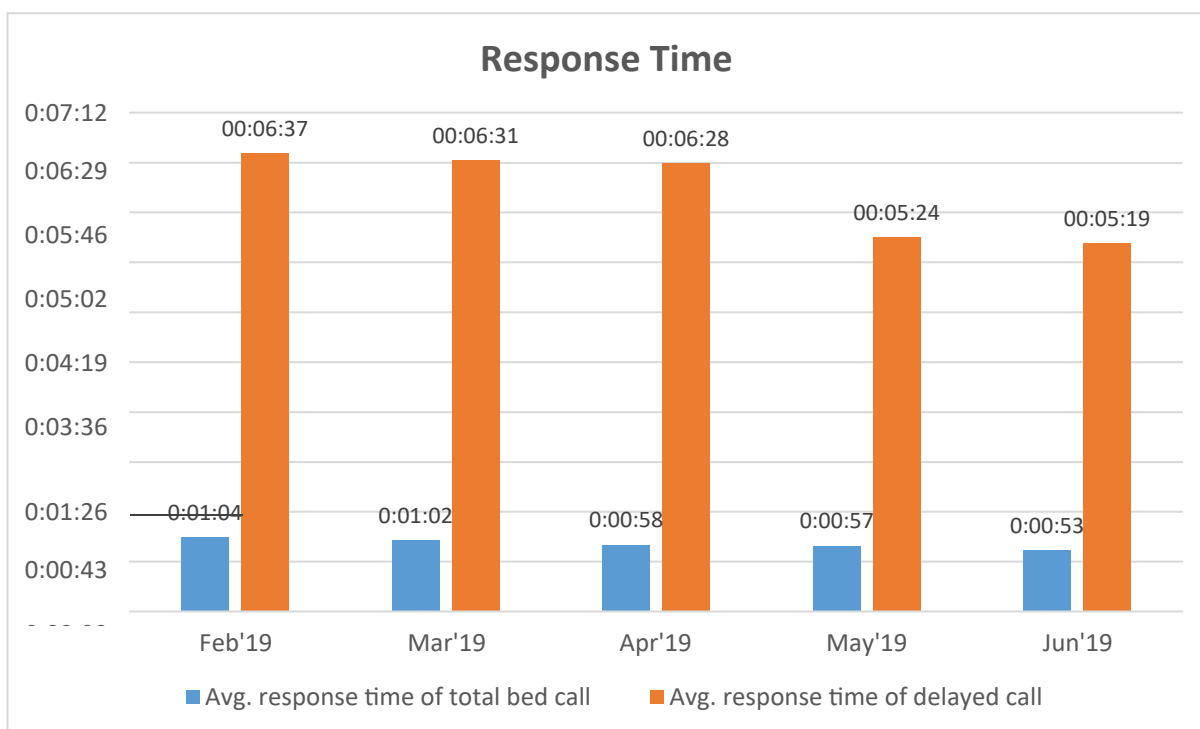
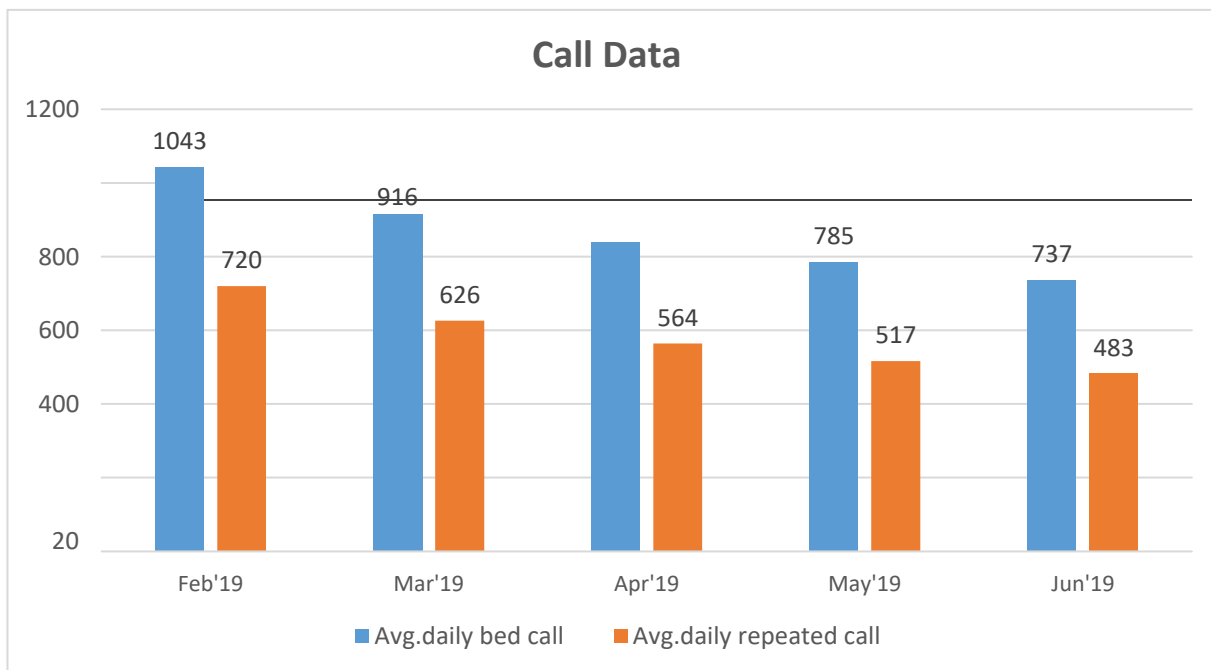


Figure 4 shows the diagrammatic representation of the success achieved by the efforts made in the project and the level of improvement gradually from the month February to June