Nurse Call System in Hospitals: System Basics, Design, Installation, and Configuration

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ABSTRACT

Tremendous technological advances that have permeated all human sciences and all daily life, especially in the medical field, many assistive technologies have been developed in the care of patients in hospitals. This technology has greatly helped to reduce the mortality resulting from the delayed provision of assistance to patients and critical cases; the nurse call system technology was one of the systems that marked a major shift in the organization of medical care in hospitals in general and in emergency and emergency care departments in particular. Which has had a significant impact on the reduction in mortality rates in hospitals and the rescue of critical cases and avoid the causes of delayed follow-up cases and prevent Vitality, which contributed to the ease of monitoring of the patient's case in his request for help and immediate response to call as soon as possible, and helped in the process The administrative control for medical staff, especially nurses, by informing them clearly and urgently about the patient's need for precise technological means. He also actively contributed to providing the best types of health care and minimizing concerns about the lack of interest by the medical staff working and Tranquility patients and their families, given the importance of mainstreaming such a system in hospitals and health centers, we find that the major interest in Sudan does not amount to the extent of its importance and the urgent necessity. This research examines the importance of this system and explains in practical terms how to create and design this system in hospitals. It also provides a comprehensive explanation of the components of the system, its design, its work and how to programming it. The results of this research show the practical application of this system, in Aliaa Specialized hospital, Khartoum state.

Keywords:- Call button; Display Units; Over door Light; Slave Call Points; Fused Junction Board.

I. INTRODUCTION

Envision you are in a healing facility informal lodging need a glass of water, or are in torment and need to address a specialist or attendant about your pharmaceutical.

Today, as you would have done 50 years back, you will without a doubt utilize a medical attendant call framework so you can summon staff to your bedside when you have to. While the frameworks themselves have scarcely changed since the war, the innovation behind them is unrecognizable from those first 'chime and signal' gadgets [1].

Those early electrical frameworks highlighted a cumbersome handset with a catch for patients to press in the event that they needed help. This sounded a ringer to ready staff. This was no uncertainty satisfactory for Nightingale wards and bigger healing facility sounds, where staff had a decent perspective of patients, yet as the clinical condition advanced, and wards were separated into littler bed narrows, so came the requirement for an alter. By the 1980s chime and signal, frameworks had been supplanted with chip-based innovation, which was not dependent on transfers and had the advantage of having no moving parts, offering more noteworthy unwavering quality at a lessened cost.

This development was vastly improved for patients, as well. With an arrangement of over entryway lights, staff would not just know when a patient needed help, however, could take the light of the individual bed sound. In any case, the third and likely most progressive advancement accompanied the landing of Internet Protocol (IP) frameworks, which have empowered, not just upgrade to the hidden innovation of attendant call frameworks, yet in addition their reconciliation into present-day web-based advances.

Addressing BBH this week, Phil Wade, deals executive at nurture call provider, Static Systems Group (SSG), stated: "Despite the fact that the crucial prerequisites for nurture call frameworks have not changed since the mid-1960s, it is a domain that has had gigantic change push onto it from an assortment

of sources including government activities, new advancements and changing therapeutic practices.

"In the 1960s attendant call depended on electro-mechanical transfers that were massive, costly and inclined to disappointment. Be that as it may, along came the thyristor, basically a 'static switch', which changed medical caretaker call fundamentally and turned into the primary segment of the new electronic frameworks being produced. "Some other key advancements that immediately took after incorporated the presentation of extra offices where, for example, radio sound was controlled from the patient hand unit to supplement the straightforward 'pear push' catch. This was the herald to numerous future extra offices controlled from the bedside." What used to be straightforward medical attendant call handsets would now be able to do an assortment of different things, including room and bed lighting, control of TV or radio, and furthermore window blinds and warming. Significantly, these automated frameworks can likewise keep a log of activities, giving a review trail of the attendant call office and reaction times for quality control purposes [2]. A medical attendant call catch is a catch found in a clinic bed that permits patients in social insurance settings to caution a medical caretaker or other medicinal services staff part remotely of their requirement for help. At the point when the catch is squeezed, a flag cautions staff at the medical attendant's station, and generally, a medical attendant or medical caretaker collaborator reacts to such a call. A few frameworks likewise enable the patient to talk straightforwardly to the staff member; others basically beep or buzz at the station, requiring a staff member to really visit the patient's space to decide the patient's needs.

The call caught gives the accompanying advantages to patients: Enables a patient who is restricted to overnight boardinghouse no other method for speaking with staff to caution a medical caretaker of the requirement for a help. Enables a patient who can get up, however for whom this might be risky, depleting, or generally hard to caution a medical caretaker of the requirement for a help.

Provides the patient with an expanded feeling that all is well with the world. The call caught can likewise be utilized by a social insurance staff part as of now with the patient to require another when such help is required, or by guests to call for help in the interest of the patient. Laws in many spots require that a call catch must be in reach of the patient consistently for instance in the patient's bed or on the table. It is fundamental to patients in crises. There are likewise laws that differ by the area setting the measure of time in which staff must react to a call. It is the duty of nursing staff to disclose to the patients that they have a call catch and to show them how to utilize It [3].

A few patients build up the propensity for abusing a call catch. This can lead staff to dissatisfaction, alert exhaustion, up to and including overlooking or neglecting the patient's calls or not considering them important. "Alert exhaustion" alludes to the reaction - or absence of it - of medical.

Care takers to more than twelve sorts of cautions that can sound several times each day - and a significant number of those calls are false alerts. Staff can't disregard such calls, as doing as such abuses the law in many spots. In some cases, psychological wellness experts will work with such patients keeping in mind the end goal to diminish their utilization of the catch to genuine need [4].

II. METHODOLOGY

Essential System part: Call button. Reset button. Alarm light. Jack socket. Inter-call Display Units: Two line LCD show. Show staffs button. Accept call button. Call status in inter-call framework: Standard Call, Call will make a short continuous tone, which rehashes at regular intervals. More than one Call

At the point when increasingly that one call is dynamic, the calls are looked on the show with their separate line position. Assistance Call help call will make two short tones which are rehashed at regular intervals. Priority Call, on the off chance that a standard call remains un-replied, it naturally changes over to a Priority Call. Emergency Call, a crisis call will make quick arrangement short tones, which are rehashed persistently. Attack Call, an assault call will make quick arrangement short tones, which are rehashed consistently. On the lower line of the LCD, the word 'Assault' is shown like a crisis call.

Over entryway Light Call Patterns: Call – Steady Flashing Red , Priority – Flashing Red , Assistance – Alternating Red and Green , Emergency – Fast Red Flashing. Attack – Rapid Red Flashing. Present – Continuous Green Indication. Call Accepted/Spoken – Steady Green lashing [5]. Slave Call Points:

These units are for the most part utilized as a part of rooms with a few beds. The unit can just produce a standard call from the CALL catch or jack attachment. There is no office to reset and this must be done on the standard call point inside the room. CS1 Ceiling Pull Switch: Roof Pull Switches are utilized as a part of restrooms, fitted to the roof over the can and shower to enable a call to be produced from these territories. They are fitted with 3 meter length of rope ended with a simple to work 'G' style draw and twin consolation markers.

IP Power Supply Controller: The ability to control a whole Intercall framework with arrangement in the fenced in area to suit a 12Volt 12AH battery for

framework reinforcement necessities. The unit includes a coordinated installed web server used to arrange the framework setup, data log access and remote checking. The Ethernet port might be utilized to associate IP controllers together, give an interface to other Intercall IP gadgets and for association with outsider items, for example, IP/DECT telephones and message paging and so on. Also, the unit highlights; locally available schedule clock and circle drive which records all framework action and arrangement settings.

FJB2 Fused Junction Board: The FJB2 replaces the prior FJB1 and gives four 'goad' yields from the system spine with each yield fusing an over current/voltage and turn around extremity insurance gadget. A front board mounted red/green LED demonstrates the state of the inner breakers and constantly screens the system information signals. Singular circuit disappointment LED's are mounted on the invert of the unit and in case of a link blame, on one of the yields, the 'goad' will be disengaged without crippling the whole link arrange.

Outline and implementation of nurse call system: don't suggest the utilization of strong center links dependably utilize the flex (adaptable) stranded option as recorded beneath or equal. System Cable for Intercall System Non-discourse Installations: Utilize a Two-Core 1.5mm2 [30/0.25 Flex] for the system 'Spine' from the power supply to the FJB's and Two-Core 0.5mm2 [16/0.2 Flex] or 4/6 Core Security Alarm Cable (least 0.22mm2 [7/0.2]) for the system goad yields from the FJB.

System Cables for Inter-call discourse Installations: Utilize a Two-Core 1.5mm2 [30/0.25 Flex] and Belden 8760 for the system 'Spine' from the power supply to the FJB's and Belden 8723 for the system goad yields from the FJB [6].

Planning and Installation: Locate the IP Power Supply in a focal area of the building and run a few Spine cables (s) starting here to FJB areas.

The most extreme length of every Spine is 100M to the farthest FJB. Every spine can bolster a most extreme of 200 current units which are equivalent to two completely stacked FJB units. Run a greatest of 4 link goads from the FJB's. The greatest length of each goad is 60M to the furthest gadget. Each goad can bolster a greatest of 25 current units. The can bolster a most extreme of 500 current units can bolster a greatest of 100 current units.

NEVER run Network links close by mains links, glaring lights, and electrical switch-equip, lift apparatus and engines and high voltage links and so forth. NEVER utilize two centers inside a four center link where the other centers are utilized by another Intercall framework or another framework, for example, Fire Alarm, Telephone and so forth.

ENSURE there is no association between any of the system links; (+) (-) (A) (B) and Mains Electrical Earth as the framework must be completely 'skimming'. Check with a meter before exchanging on the framework.

NEVER play out a high voltage protection test with gear associated with the cabling as you will crush the system gadgets.

IMPORTANT the link lengths limits accept that FJBs/Network Devices are situated at consistent interims along the length of the link and that a most extreme of 20% of the call focuses are calling at any one time. This breaking point can be expanded by diminishing the length of goad or decreasing the quantity of current units appended to the goad.

Zoning establishment: The INTERCALL framework highlights far reaching zoning offices which can adapt to most zoning prerequisites. The standard of zoning is to empower calls to be shown just in the territory from which they start. This could be accomplished by introducing separate frameworks, however, this does not give 'ace' showcases where all calls can appear or the capacity to show crisis 'crash' calls all through the working to caution different individuals from staff.

With the INTERCALL framework, the zoning is arranged and controlled by the show units. They have terminals for the zone switch and implicit menu capacities, which are utilized to design the zone necessities. At the point when a framework is zoned, we should focus on the call point locations and negligence the content that is related to that address as this should be re-customized when the framework is dispatched [7].

System configuration: IP Power Supply Controller Connections: You can make an essentially one– to–one association with your portable PC phone an Ethernet traverse link. This will enable access to the on-board site pages for framework setup. No exceptional programming is required; get to is by means of a standard web program, for example, Internet Explorer or Firefox. To make a coordinated association with your tablet, you may need to modify the IP settings on your portable PC and set a manual IP Address.

IP Power Supply Contact Inputs: The highlights two onboard autonomous shutting contact inputs which might be designed for the accompanying operations:

APPLY EVENT – Create an approach the framework, Call sort, address and client might be indicated utilizing the fields on the screen. RESET UNIT - Perform a hard reset.

RESET SLOTS - Reset every approaching occasion on a crossed over or circulated framework

RESET OP1, For instance, a yield can be utilized to actuate a strobe or sounder, the information can be

designed to reset that yield to go about as a quiet or reset catch/key.

RESET NET. Reset all gadgets (Call Points, Displays and so forth) on the Output Network [8].

Inter-call IP Embedded Web Server: The Inter-call IP16 Power Supply Controller contains an installed web server for framework arrangement and status observing. It is utilized access the on-load up information lumberjack recording all framework movement with the date and time and to permit secret word secured access to the framework arrangement and systems administration page [9].

Framework Configuration Screen – Inter-call the primary screen is the framework setup screen which permits arrangement of the worldwide framework settings, which beforehand were designed utilizing the design DIP switches in the Power Supply. The Day/Night Alarm Schedule is additionally gotten to from this screen and the setup get the secret key can be changed.

Addresses - Address Descriptions: The Address and User Descriptions might be physically gone into the website page by page with the Save catch squeezed before leaving each page. On the other hand, might be transferred from an Excel spreadsheet.

Command – Network Commands: The commands page contains four basic commands; Broadcast – Send the current Address, User, System, and display text to the displays. Reboot System Restart the IP Controller and all Network Devices. Reset Devices - Reset the Network Devices only and Reset Remote Slots – Reset device addresses set by other IP devices and controllers [10].

III. RESULT AND DISCUSSION

First state: Here is the result of practical working after installing and operating nurse call working zone: system in Aliaa (2) hospital – Omdurman – military hospital in 2nd of November 2017

Figure (1) Nurse Inter-call first state (the view)

This button in Figure 1 located near to the patient beds when a patient or co-patient need for help, they have to press this button and will flashing with red light. This alarm will arise over the room door (over the door) as is shown Figure (2).This alarm will arise over the room door (over the door) as is shown Figure (2). when experiencing that in room No 3.

Figure (2) Nurse inter-call first state (over the door)

That call with No 3 must arise in the display unit controller with alarm sound which is located in the nurse station as is shown in Figure (2).

Figure (3) call from room No 3 arise in the display unit

Also, this alarm arise in the all zone sections in LCD monitors in case that the nurse is not in nurse station, as shown in Figure (4)

Figure (4) Alarm arises in the all zone sections in LCD monitors.

Nurse get the number of the room that request with alarm, she must press the button " accepted" choice in the display unit controller as shown in Figure (5)

Figure (5) nurse get the number and press "accepted"

after that, the alarm voice will stop automatically and the light of the over the door and the slave /master call point will change from red to the green flash light, and that as a response for the patient as shown in Figure (6).
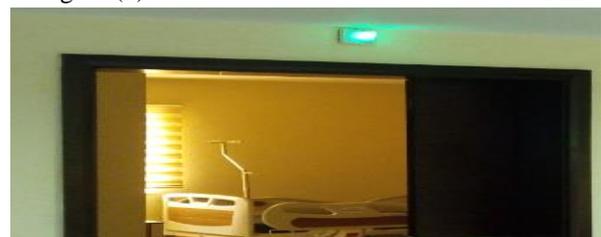

Figure (6) alarm voice will stop automatically and the light of the over door change to green

when the nurse arrived at the patient she must press

on the button of " reset" in the master call point device to start over again   as shown in Figure (7)

Figure (7) press on the button of "reset" in the master call point device to start over again

The network saved this case in the main computer with specific software and can show this case in details in the table below.

11/2/2017 1:12:05 PM	Reset
11/2/2017 1:11:07 PM	Accept
11/2/2017 1:09:12 PM	Call

Figure (8) the network saved this case in the network computer

Second state: In case that if the patient or co-patient presses the button and he didn't find a response from the nurse station. in this case, nurse call will count for three minutes after the request and send an emergency alarm in all screen and devices connected as shown in Figure (9)

Figure (9) - Second state - priority case

And the network copy that case as shown in in Figure (10)

11/2/2017 1:22:28 PM	Reset
11/2/2017 1:21:10 PM	Priority
11/2/2017 1:18:37 PM	Call

Figure (10) the network copy the case

Third state: In the case when the patient state urgent or critical, immediately the nurse will press on the two button (call and reset button) together continuously in the call point as shown in in Figure (11)

Figure (11) Third state - Emergency case

This alarm will arise as speed red flash and different alarm voice and will arise in all device connected with the system.

Figure (12) alarm will arise as speed red flash and different alarm voice

computer network also save this case as is shown in Figure (13)

| 11/2/2017 1:16:23 PM | Reset |
| 11/2/2017 1:15:10 PM | Emergency |

Figure (13) computer network saved this case

after this test the system several time with all cases above and we find the results in Figure (14):

Event History	
Timestamp	Event
11/2/2017 1:48:00 PM	Priority
11/2/2017 1:45:27 PM	Call
11/2/2017 1:43:54 PM	Accept
11/2/2017 1:43:03 PM	Call
11/2/2017 1:42:15 PM	Reset
11/2/2017 1:41:19 PM	Emergency
11/2/2017 1:40:57 PM	Reset
11/2/2017 1:40:33 PM	Accept
11/2/2017 1:39:15 PM	Call
11/2/2017 1:22:28 PM	Reset
11/2/2017 1:21:10 PM	Priority
11/2/2017 1:18:37 PM	Call
11/2/2017 1:16:23 PM	Reset
11/2/2017 1:15:10 PM	Emergency
11/2/2017 1:14:45 PM	Reset
11/2/2017 1:14:33 PM	Accept
11/2/2017 1:14:26 PM	Call
11/2/2017 1:14:24 PM	Reset
11/2/2017 1:14:14 PM	Accept
11/2/2017 1:14:04 PM	Call
11/2/2017 1:13:30 PM	Reset
11/2/2017 1:13:08 PM	Accept
11/2/2017 1:13:01 PM	Call
11/2/2017 1:12:05 PM	Reset
11/2/2017 1:11:07 PM	Accept
11/2/2017 1:09:12 PM	Call
Count: 26	
Filter is Empty>	

Figure (14) nurse call reports

IV. CONCLUSION

To sum up, clear to us the importance of the nurse's call system, which helps in the integrated focus on the patient's condition and on the continuous follow-up of everything that happens in the state of health.The Nurse Call System is one of the devices that has facilitated the work of medical personnel and has contributed effectively to reducing the mortality rate in the medical field. It has also contributed to increasing survival rates from critical and dangerous cases. This is a primary and primary goal for all medical personnel, Emergency departments and

sections of detention in public hospitals. It was also clarified through following the previous chapters in this paper that great efforts have been made to keep a work of the technological development and utilization of it to optimize utilization in the development of follow-up of patients and to mitigate the risks caused by diseases and injuries.In conclusion, this system is one of the systems that made a big difference in the services provided in hospitals, and it has become an important feature in the differentiation between developing, modern hospitals and others.

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