The Application of Active Notification Medical Procedure for the Assistance of Elderly Patients

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Abstract--Care of the elder patients usually differs from standard medical procedures. The medical examination of elderly patients should be done with a different approach. The elderly also have different, often more complicated health care problems, such as multiple disorders and inabilities, which may require additional time to transfer for further examination and should not be rushed.

This study proposed an active notification medical process combined with well-trained elder assistants can be applied to improve medical flow to deal more effectively with older patients. When an elder patient was identified by the register system or wristband RFID, a notification agent will push alert message to notify the assistant group on the system and provide an instance help in the exact location. A satisfaction survey was conducted, 106 patients evaluated, where 32.1% between the age of 70 to 75, 24.5% between the age of 60-70, and general medicine patients 33.5% (69), obstetrics and gynecology 8.7%(18) and the most satisfied item is the decrease of waiting time.

I. INTRODUCTION

Care of the elder patients usually differs from standard medical procedures. For elderly patients, especially those who are very old or frail, history-taking and physical examination may have to be done at different manager. The elderly also have different, often more complicated health care problems, such as multiple disorders and inabilities, which may require additional time to transfer or exam and also need extra help.

Like children, the elderly patients require special approaches and understandings since elderly persons are especially vulnerable to loss of functional capacity arising from the interaction of medical treatment. Care of the elderly patients in a hospital must focus on the identification and the immediate help.

Active notification function architecture was designed to integrate with medical process which can provide a quick response for the help of elderly patients, for example, appear with well trained assistants or volunteer. Elder patients in a hospital can be identified by the register system, RFID wrist band, and mobile device, a notification agent for this architecture will push active message on the system to notify the assistant group that an elder patient in a specific area need help.

II. LITERATURE REVIEW

A. The healthcare problems of elderly patients in hospitals

The admission of elderly patients to a hospital, their treatment, and subsequent discharge can prove challenging. The study shows that elderly patients had a higher incidence of preventable events related to medical procedures (such as thoracentesis, cardiac catheterization), preventable adverse drug events, and preventable fails [4].

The elderly also have different, often more complicated health care problems, such as multiple disorders, this makes diagnosis more difficult and leads to severe delay or medical errors. Patients may not accurately remember past illnesses, hospitalizations, operations, and drug use. Physicians or assistances of the hospital may have to help the elder to obtain these data. A study of Fried and Storer in 1991 shows hat more time and method is required to evaluate elderly patients, light control of inner room will help for the visual [7].

The elderly may also be reluctant to report symptoms because they fear hospitalization or may just have difficulty describing problems with impaired cognition.

Mental health issues may not be detected easily in elderly patients and should pay very attention. Helpers or assistants of the hospital should know about the mental status of patients. A variety of medical conditions and psychiatric disturbances are potential causes of psychiatry symptoms. Acute changes will be different from the mental state [8].

The hospital should also acknowledge patients' living arrangements, particularly when and with whom they live (e.g., alone in an isolated house, in a busy apartment building), accessibility of their residence (e.g., up stairs or a hill), and what modes of transportation are available to them. Such factors affect the ability of the elderly to obtain food, health care, and other necessary resources [3]. A study did a meta-analysis on 28 controlled trials comprising 4,959 subjects suggests that medical programs linking geriatric evaluation with high long-term management are useful for improving survival and function in older persons [5].

We can more easily to track the underlying history and provide immediate assistant of the elder patients mentioned above by the integrated system of EMR (electronic medical record), patients identification system, and active notification message.

B. Assistant of the elderly patients in hospital

The weak, elderly patients need to be identified and services commissioned according to their needs [6]. Sensory

deficits, especially hearing problems, may interfere with talking in the hospital and should be helped by the well-trained assistant. If the elderly patients become fatigued, the medical process should need to be stopped.

Elderly patients may require additional time to undress and transfer to the examining table and should not to be rushed.

Comprehensive geriatric medical care is most successful when done by a geriatric interdisciplinary team composed of different medical experts [4]. This team was typically composed of a geriatrician, nurse, social worker or well-trained assistant, and pharmacist. Usually, medical care is done in an outpatient setting. However, patients with physical or mental impairments and chronically ill patients may require inpatient assessment [4].

III. METHOD

This study proposed an active notification medical process combined with well-trained elder assistants can be applied to improve medical flow to deal more effectively with older patients. When elder patients were identified by the register system or wristband RFID, a notification agent will push actively shown on the system to notify the assistant group. An assistant then stands directly in the patient's line of sight and be ready to provide assistance. Speak slowly and use short, simple sentences, carefully explain each procedure and its purpose then lead to a particular design examination room where is secure and distraction-free.

Core components of this active notification medical process architecture was described as follows:

A. A Cloud-based Database

The health information of elderly patients was exported into a shareable cloud-based database for the purpose of direct sharing (Fig. 1). The authorized medical unit or system can connect and retrieve the patient's data when whose ID was identified by register system or wristband RFID reader. The follow-up data can also be retrieved by the elderly patients' family members in their place by proper secure login (Fig 2).

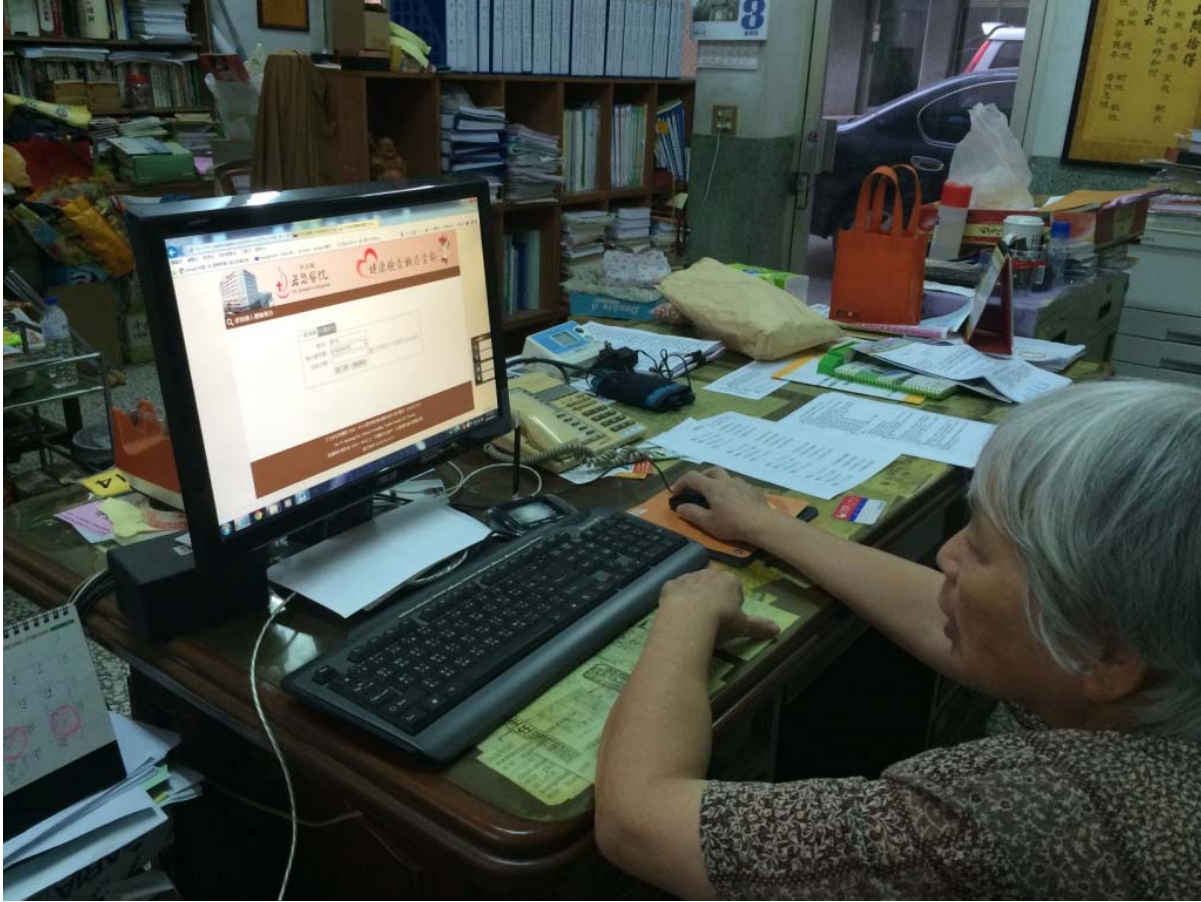Fig. 1 A Cloud Database Export Example.

Fig. 2 Login page for the data query of elderly patients use by their family members.

B. Active Care Physical or Well-train Volunteer Assistant

The notification system will push a message (content of the message are the location, primary identification data, and other necessary information) to notify the particular assign assistant (Fig. 3).

C. A Friendly Medical Exam Environment and Channel for the Elderly

When an elderly patient needs a medical exam, the lab system will retrieve the data from cloud database and assigned a particular priority channel for the patient. The shareable health information will also be used for the preparation of exam machine and tubes. Elderly patients will feel a quick and no error exam environment. Fig. 4 shows the difference in the average complete time for the lab examination per patient.
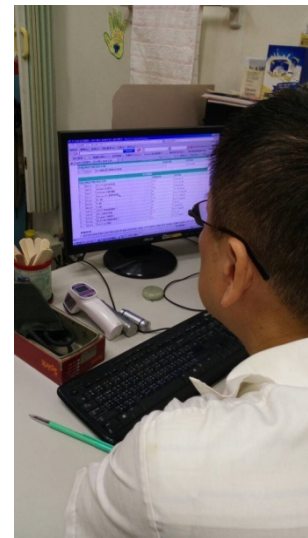

Fig. 3 The active notification system will push message to the available assistant for the immediate help of elderly patient when the system identified an elderly patient (ex.: over than 65 years old).
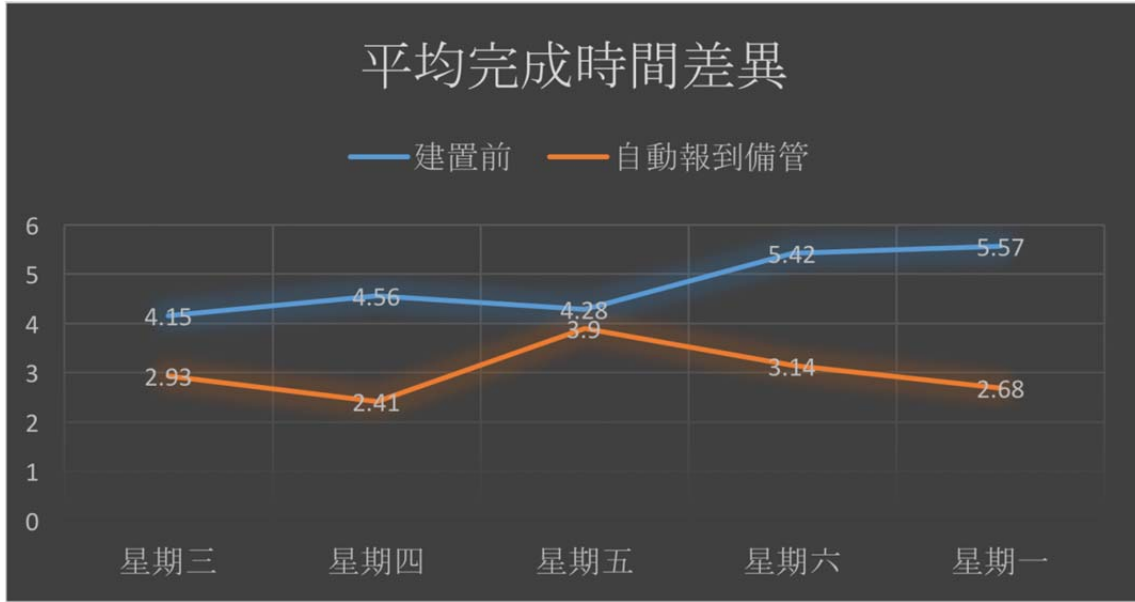
Fig. 4 Average complete exam time before (blue) and after (red) the implementation of the elderly friendly environment.

A satisfaction survey was conducted after the service of this active notification and assistant system. 106 patients evaluated in this survey, where 32.1% between the age of 70 to 75, 24.5% between the age of 60-70. General medicine patients 33.5% (69), obstetrics and gynecology 8.7%(18). The most satisfied item is the decrease of waiting time. A statistical test result was shown in Table 1.

TABLE 1 DIFFERENCE OF THE FRIENDLY EXAM ENVIRONMENT

	Items	F test	p	t
1	Easy to find the location	0.462	0.0001***	-5.748
2	Personal identification	10.258	0.0001***	-5.553
3	Environment comfortable	0.152	0.0001***	-9.407
4	Privacy	0.046	0.0001***	-8.639
5	Procedure	1.634	0.0001***	-2.398
6	Waiting time	6.88	0.0001***	-6.095
7	Report time	11.302	0.0001***	-8.159
8	Physician	19.887	0.0001***	-6.516
9	Understanding	5.8	0.0001***	-5.137
10	Simplicity	5.31	0.0001***	-7.394

($* p<.05, **p<.01, *** p<.00001$)

Fig. 5 Elderly patient help by the volunteer and automatically identified by the register system.

IV. RESULT AND DISCUSSION

This active notifies and help system using innovative information technology process to reduce the risk and cost for the assistance of the elder patients in a hospital.

Result of this active notification system shows some benefits:

1. Data of elder patients export from HIS (Health Information System) to the cloud database can quickly access for another sub-system.
2. Users or clinics outside of the hospital can access cloud data by the VPN (Virtual Private Network) for data security. The user can login to a Web-based interface page to retrieve their personal information.
3. Volunteer assistants were especially needed in the lobby when elderly patients enter into the hospital and make registration. The second most needed area was in front of the laboratory exam.
4. Waiting time for the patients was decrease 5% after the implementation of the system (Refer Fig. 4, the average waiting time for patients before and after the system implementation are 4.796 minutes and 3.012 minutes).

For the consideration of elderly patients' inconvenient in the hospital, an active notification system integrated into the medical process and the active assistant from the volunteer can provide a comfortable and sooner medical service for the elderly patients. As the growing of aged population, this architecture should provide a practical solution for the care of elderly patients.

V. CONCLUSION

A shareable cloud-based database infrastructure plays a useful role in this active notification system, although the cloud information can not be used by most of the elderly patients directly. The assistant for the elderly patients plays a successful factor in this study, where, push message of this system made the assistant appear appropriately and immediately in front of the elderly is the most import successfully factor. An elderly friendly exam environment and priority channel are also helpful.

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