

# An Interactive Outpatient Reminder System

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## Abstract

There is a distinct value add in terms of lost revenue for patients that do not attend clinic appointments. The cost of patients not attending clients is now directly contributing to the inefficient control of the health services with the associate cost per patient now estimated at 100 euro on average with an average yearly lost of 400 million estimated. The ability to improve and reduce the number of patients that attend outpatient appointments is seen as a vital component in the continuing efforts to introduce efficiencies in this sector of healthcare. The system proposed here is an interactive, two-way messaging system that not only alerts patients to upcoming outpatient appointments, but also facilitates a quick and seamless reply path as to whether they will attend or not the clinic. This communications pathway is allows for effective patient management and control.

## BACKGROUND

There is now a recognised paradigm shift in the delivery requirements of healthcare at both a national and international level. Due to the changing shape of world populations, long term and chronic care patients will dominate the healthcare sector in the near future [1, 2]. This is based on increasing life expectancies and reduced birth rates. Traditional health services are experiencing an increased burden as they try to adjust to this dynamic change, with 80% of GP consultations, 60% of hospital bed days and two-thirds of emergency admissions related to patients with chronic and long term conditions [3]. Clinical and out-patient appointment numbers are set to increase in line with this shift in healthcare requirements. Missed appointments or “Did Not Attends” (DNAs) represent a substantial cost for both public and private healthcare service providers [4]. It has been shown that the average cost per patient not attending clinics is 100 euro[5]. Figures released in 2004 outline that almost 9 million appointments are missed each year, with these numbers set to increase in line with increased numbers of long-term care sufferers [6]. Patients who do not attend for their hospital appointments prevent other patients on the waiting list for receiving prompt treatment. This poor control of patient flow in turn contributes to increased waiting times, now estimated at being over 13 weeks [7, 8].

In response to these problems, healthcare providers have looked at introducing new outpatient booking systems as well as targeting repeat offenders with letters via post [9].

The problem of DNAs reflects the fact that patients have a key part to play in primary care [10]. However, the majority of solutions in existence depend on a ‘partial booking’ system whereby patients receive a letter asking them to ring in a date that best suits them. Such systems have a short term benefit with a 12% decrease in DNA numbers being reported [11 web-medical news]. However, there are inherent problems with such a solution, the most obvious being the delay in making and attending an appointment. This delay, sometimes upto 6 months, can cause patients to miss their appointment date as well as allowing them no flexibility in re-scheduling.

## METHODS

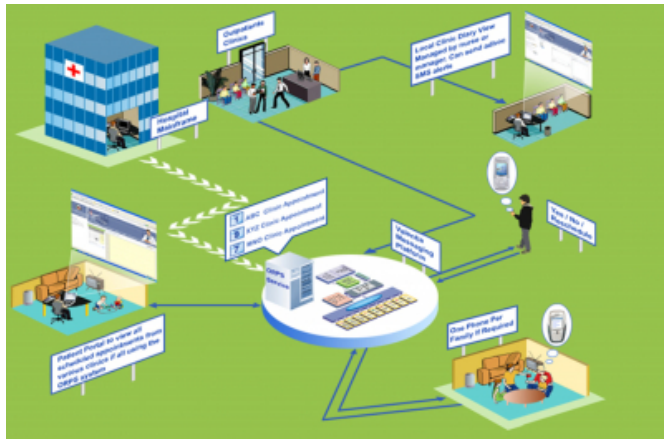
This paper focuses on the use of Valentia's Outpatients Reminder and Paging System (ORPS). This two-way messaging system enables Outpatients Departments in hospitals and clinics to tackle the problem of DNAs. Using ORPS, outpatient departments can send SMS appointments reminders to patients at predefined intervals and times prior to their scheduled appointment dates. ORPS also gives patients an ability to cancel or reschedule their appointment if they are unable to attend, thereby allowing managers to notify alternative patients of available freed-up appointment times. ORPS can play a similar role in GP practices, chronic disease management clinics and day cases.

ORPS is driven by an enterprise level gateway service that allows for two-way communications behind patient and hospital server. Patient record files existing on Patient

Administration Service (PAS) systems can be accessed automatically from within the ORPS structure. Fig. 1 outlines the basic components of the system with ORPS plugging in to existing services and communicating via GPRS/ TCP IP with patients. Manual intervention is reduced and a more streamlined automated booking system is created.

**Figure 1**

Figure 1: ORPS Block Diagram



The basic components that comprise the ORPS system is as follows.

Central to the functionality of ORPS is Valentia's messaging platform which provides a link between the hospital records system and the patient. There are several paths to and from the gateway depending on the task. The ORPS service centre sits on the gateway and links dynamically to the hospital mainframe system.

Appointment information such as name of patient, data of birth, date of appointment, relevant clinic etc. are and placed in a messaging queue based on pre-defined thresholds. A common choice was to have a 2-day timeframe. That is, patients that were to be seen in 2-days time were prioritised in the queuing system with SMS messaging used to contact the patients. This message service can be accessed using patient's mobile phone numbers as identified in the contact details located in the PAS system. SMS is sent in the standard way using existing GPRS networks so that there is no overhead in terms of infrastructure. Readers are referred to more detailed discussion of SMS messaging techniques [12]. As the ORPS application sits on the gateway, two way messaging is facilitated that allows individual users to reply back using a 'Yes-No' facility confirming, or not, their attendance. This is a unique and real-time solution that allows both users and out-patient clinics to respond to

availability in a dynamic and efficient manner. New appointments can be made 'on-the-fly' with the queuing system directed as defined by templates. These templates vary from deployment to deployment and newly available time slots can be chosen from a FIFO (first-in first-out) based system, for example, whereby most recent data in the queuing system is offered to the SMS engine of ORPS. This and other mechanisms allow hospital administrators to choose the most suitable patient to fill a missing slot. Patients that are unable to attend are re-scheduled within the appointment database and contacted accordingly. The deployment of ORPS in a hospital environment allows the development of a holistic response to healthcare with patient empowerment playing a central role. Using a web-based portal, patients can access clinical appointment schedule and integrate with their online calendar application.

In addition, information within the outpatient clinic can be sent to waiting patients. This is possible using the nurse's based portal that allows instant access to patients acknowledged as attending the clinic, and allows for greater transparency and control.

### INTERNAL FUNCTIONALITY

ORPS administrator users can be of two types:

- Admin User
- Basic User

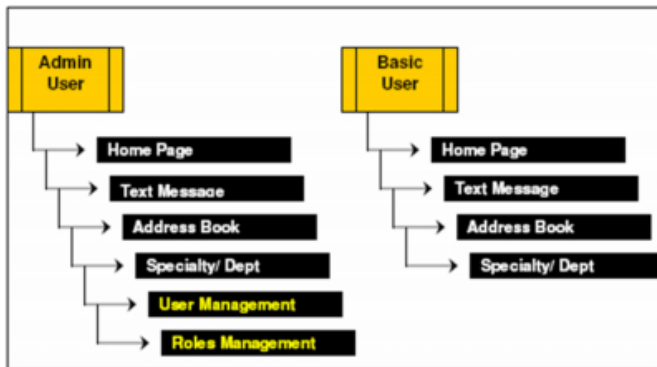
Admin users have the full rights to the system (including User and Role Management) whereas

Basic users are provided with standard user rights for standard system usage. Basic users can have different access rights based on the role assigned to them. Only users assigned to a certain role can view departments, clinics and address books within that role.

The different functionality associated with each group is shown in Fig.2.

**Figure 2**

Figure 2: Various functions within the ORPS system.



Users of the system, irrespective of their category, can avail of three separate services:

- Text Messaging
- Address Book
- Speciality Dept.
- Templates

**Figure 3**

Figure 3: User SMS interface

Recipient: 0961553567  
Name: Brian Adams

Mobile Number: 0961553567  
Address Book: Brian Adams

Text Message: St. Gabriel's Hospital Hosp. Reminder: You have an appointment on <Appointment Date>. Can you attend. Text Y or N OR Ring: <Clinic Number>

Schedule Message Delivery: January 22, 2007 09:52

Send SMS

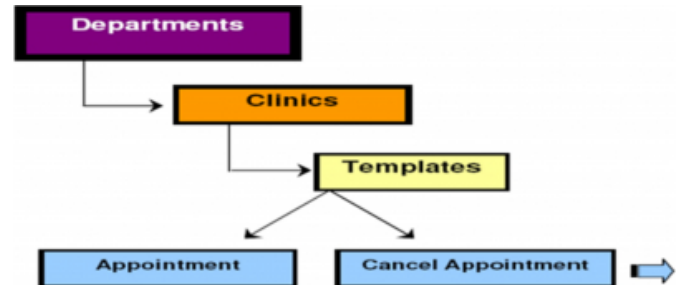
Users can create pre-defined SMS messages that are automatically routed to patients or can if require use the interface as displayed in Fig.3. This information is user specified and information on contact numbers are accessed through the PAS system.

As different departments often exist within the one healthcare organisation, it is important to organise messages based on relevant clinic. Fig.4 outlines the structure within ORPS that allows users within different groups to specify different templates for messaging. In addition, patients that access information via the web-portal have the option to organise based on hospital clinics. The division of structure

within Fig.4 is based on clinics acting independently within the one framework, thereby allowing for delegation of control from central administrators to local ones.

**Figure 4**

Figure 4: Department and Clinic Hierarchy



**Figure 5**

Figure 5: Interactive GUI for group administration

Address Book

Group Name: Emergency Group

Group Role: This group is only for emergency contacts.

User Authorized Roles: HEALTH, Emergency

Group Assigned Roles: HEALTH, Emergency, Trauma, etc.

Group Members

Add Members Update Cancel

In addition to defining group specific templates, it is possible to easily define new groups, based on client requirements, as outlined in Fig.5. In this way each clinic in a hospital will be assigned a user group from which patients relevant to that specific clinic can receive clinic specific information. Control of user groups allows access and control of appointment scheduling across hospital systems should that not already be in place.

## CONCLUSION

Reducing patient Does Not Attend (DNA) is at present a logistical impossibility, with clinics unaware in advance as to the numbers of patients attending at any one time. The number of DNAs has a direct impact on both patient care and is fast becoming an important area of research in terms of increasing patient care as well as reducing administrative costs.

In line with the shift towards long term care, it is important to implement effective preventive health systems. Clinics and outpatient systems are at present the most effective way of doing this and as such it is now necessary to develop fully integrated solutions that control and reduce clinic DNA

numbers. This is important in order to reduce missed clinical interventions [13]. Computer-based reminder systems have been shown to increase clinicians' rates of compliance with guidelines, especially in preventive health maintenance interventions [14, 15]. However, what is missing in all cases up until now is the ability of the patient to respond to patient reminders in a dynamic and effective fashion. Using ORPS, the interactive outpatient reminder system, a novel and cost effective method of dealing with patient DNA has been addressed. In addition, web based browser applications aligned to ORPS allow patients to access clinic information from their home. ORPS is a two way based communications solution that is fully integrated with existing PAS systems. It provides an easy to use solution that is portable across healthcare clinics. The technological capabilities are transparent at all times to both users and patients, with the overall benefit of ORPS being a reduction of DNAs due to notification close to appointment times. The additional facility of offering confirmation via a text based routine allows hospitals to reorganise resources in a cost effective manner. The system is currently in place and has been shown to date to deliver significant savings with DNAs already significantly reduced. More substantive figures will be available at a later date.

### References

1. 'Improving the quality of health care for chronic conditions', J E Epping-Jordan, S D Pruitt, R Bengoa and E H Wagner Quality Safety Health Care 2004;13:299-305
2. 'Transforming chronic care: a systematic review of the evidence', Debbie Singh and the Surrey and Sussex Primary Care Trust Alliance, Evidence-based Cardiovascular Medicine, Volume 9, Issue 2, June 2005, Pages 91-94
3. Self Care - A real choice. Self Care Support - a practical option, U.K Department of Health, 2005,
4. 'Missed Appointment Rates in Primary Care: The Importance of Site of Care', Lasser, Karen E. Journal of Health Care for the Poor and Underserved - Volume 16, Number 3, August 2005, pp. 475-486
5. <http://www.medicalnewstoday.com/medicalnews.php?newsid=12446>
6. Institute of Healthcare Management
7. 'Getting more for their dollar: a comparison of the NHS with California's Kaiser Permanente', Richard G A Feachem, Neelam K Sekhri, Karen L White, BMJ 2002;324:135-143 ( 19 January )
8. 'NHS Inpatient And Outpatient Waiting Times Figures' - December 2006, UK Main Category: Public Health News Article Date: 06 Feb 2007
9. 'Trial of postal reminder versus no reminder in single-handed dental practice', Reekie et al, Br Dent J 1998 185:472-4
10. 'An overview of interventions to improve compliance with appointment keeping for medical services.' WM Macharia et al. ,JAMA 1992 267: 1813-1817
11. [http://www.wise.nhs.uk/NR/rdonlyres/3637BA0A-E8E6-4407-91C3-87AF6E1DA2B8/656/PagesfromHIC\\_for\\_web2.pdf](http://www.wise.nhs.uk/NR/rdonlyres/3637BA0A-E8E6-4407-91C3-87AF6E1DA2B8/656/PagesfromHIC_for_web2.pdf)
12. <http://www.activexperts.com/activsms/sms/smsc/>
13. 'The impact of clinical reminders and alerts on health screenings: the VA Pittsburgh Healthcare System achieves notable results by enhancing an automated clinical reminder system within its CPR-and has the data to prove it - Clinical Information Systems', Robert R. Calabrisi, Tammy Czarnecki, Carla Blank, Health Management Technology, Dec, 2002
14. 'Measuring the Effects of Reminders for Outpatient Influenza Immunizations at the Point of Clinical Opportunity' Paul C. Tang, MD, Michael P. LaRosa, PA, Carol Newcomb, MHSA, and Susan M. Gorden, J Am Med Inform Assoc. 1999 Mar-Apr; 6(2): 115-121.
15. 'Reminders to physicians from an introspective computer medical record: a two-year randomized trial', McDonald CJ, Hui SL, Smith DM, et al.. Ann Intern Med. 1984.;100:1308.

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