

Telemedicine

Chapter 3

Electronic Interconsultation Platform between a Hospital Pharmacy Service and Primary Care Pharmacy Units in Spain

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Abstract

Purpose: To present the requirements, development and structure of an electronic interconsultation platform (e-Interconsultation) for communication between primary care pharmacy units and a hospital care pharmacy service and to analyze the profile of consultations made using it.

Method: A working group was created and set out its purposes, working schedule, software requirements, the structure of the electronic platform, validation procedure, and its implementation. Once the software was developed and validated, training sessions were conducted and the electronic platform was launched in June 2015.

Descriptive and retrospective analysis of the number and type of e-Interconsultations for five years in a health area. Data source: data mining of the e-Interconsultation platform (Microsoft Sharepoint® software).

Results: A total of 2032 interconsultations have been made and 91.7% solved. 893 (44%) of them were referrals from hospital care to primary care in addition to 1139 (56%) from primary care to hospital care. The validation of prescriptions and the need for drug monitoring in primary care are among main reasons for consultation.

Conclusion: this two-way electronic platform of communication is a good mechanism that collaborates in patients' transit between different healthcare levels because it allows us to facilitate, normalize and document consultations, referrals and pharmaceutical interventions between hospital care and primary care. Therefore, it helps us provide better quality pharmaceutical care to our patients and promotes the rational use of medicines in our healthcare environment.

Keywords: Pharmaceutical Services; Health Care Quality; Transitional Care; Medical Informatics; E-health.

1. Introduction

The digital transformation concerning the health system invites us to incorporate new information technologies in order to help us to improve cost-effectiveness, safety and quality.

In our country, the Spanish National Health System has progressively evolved from a compartmentalized model formed by two large-scale structures, hospital care (HC) and primary care (PC), into a cross-sectional, horizontal, integrating model. In this new model, patients must receive continuous care regardless what health level they are in [1]. This change in the care-providing model has also been incorporated and promoted in Spain's different Regional Health Systems, especially over the last ten years, to remove health care related barriers and the management of chronic care [2-6]. So, hospital pharmaceutical care has become more continuous and focused on the patient because transitions between levels of care are a critical point in the quality and safety of pharmacotherapy. In this regard, some reference professional scientific societies (SEFH - Spanish Society of Hospital Pharmacy- and ASHP-American Society of Health-system Pharmacists) are developing initiatives and strategies promoting integral pharmaceutical care for patients (in-hospital and outpatient) via the incorporation of the new technologies for achieving the care-providing objective [7].

The University Hospital Complex in our study is a high-level 1450-bed hospital covering a health area with approximately 550,000 inhabitants. 28 hospital pharmacist staff work at the Pharmacy Department who are also responsible for the pharmaceutical care at several

geriatric facilities (approx. 1,200 beds). Similarly, there are 12 PC pharmacists distributed among primary medical centers (71) spread throughout the health area. Both levels (primary and hospital) are integrated under one same Integrated Management Administration called Xerencia de Xestión Integrada A Coruña (XXIAC), each one of which is under a separate medical management.

Pharmaceutical care promotes care safety through procedures as medication reconciliation, drugs information at hospital admission/discharge or continuous drug monitoring. Care models that incorporate interdisciplinary working and effective communication between hospital and community pharmacists, and with other health professionals of different care levels, have shown lower rates of hospital readmission in their patients. Therefore, the mission of the Pharmacy Service at our hospital has been determined as “contribute to improve the health results of the population, in cooperation with the multidisciplinary team, by providing personalized, integrated, coordinated, safe and quality pharmaceutical care.” Reaching this continuous healthcare and incorporating new technologies are among the bases of the new pharmaceutical care model in the Pharmacy Service.

Transitions between healthcare levels are critical points where drug related problems could happen due to poor communication and/or coordination between professionals or with patients. Thus, it is necessary for HC and PC pharmacists to communicate for providing continuous pharmaceutical care to the patients. Improving communication and documentation at hospital discharge is something we must all work harder on to reduce patients’ drug related problems at discharge [8].

Before the implementation of the e-interconsultation platform, communications between PC and HC pharmacists concerning specific patients in our health area were carried out without any officially approved procedure, usually by telephone or e-mail.

The development of the electronic platform of communication started in January 2015.

The purpose of this study is to present the requirements, structure and development of the e-Interconsultation platform and to analyze the results obtained after five years of its implementation.

2. Method

To carry out the development of the e-Interconsultation platform, a multidisciplinary working group was formed, comprised of three Hospital pharmacists, a primary care pharmacist as the spokesperson for all those belonging to the A Coruña Integrated Management Area (XXIAC), a Primary Care Administration executive (to whom the primary care pharmacists report) and a professional from the Information Systems and Technologies department (a

computer engineer). At its first meeting, this working group set out its objectives, working schedule, the computer program requirements, the program structural design, the validation thereof in pilot trials and the implementation.

After setting the working schedule (the intention was to have the system implemented within a six-month period), the requirements of the e-Interconsultation platform were established:

1. To allow the access and identification of the users (PC and HC pharmacists of the health area).
2. To allow a two-way flow of consultations between healthcare levels.
3. Encoded patient identification to keep confidentiality.
4. To channel and standardize the consultation in terms of their source, primary care or hospital care, as well as the results thereof for their subsequent follow-up.
5. To standardize the purpose for which each consultation is made.
6. To make it possible to know the status of the consultation, in other words, whether it is pending a solution or if it has already been solved.
7. To have an alerts system informing the users when a new consultation is made.
8. To allow data mining by the different parameters of which it is comprised.
9. To be fast, stable, intuitive, simple to access and easy to use.
10. All of these requirements were brought to the computer engineer in the working group for the development of the platform structure.

In following, the pilot trials and drills of consultations between hospital care and primary care were carried out. Following their validation, the accesses were created for all of the pharmacists involved (33 in all), informative and training sessions were held and the system was launched in June 2015 following the approval of the executives in charge of the health area.

To analyze the utilization of this communication system, a descriptive, retrospective study of the consultations made through the e-interconsultation platform in the period from January 1, 2016 to December 31, 2020 (60 months) was carried out.

The data source has been the e-interconsultation platform using Microsoft Sharepoint® software. Inclusion criteria: all e-interconsultations made during the study period in both ways.

3. Results

3.1. Structure and operation

The computer tools selected as the basis for developing the platform was Microsoft Sharepoint®, which is based on web technology, where the two-way functions between hospital care and primary care were configured.

The fields set up are shown in figures 1 and 2 (HC-to-PC and PC-to-HC online interconsultation forms). Patients' identification is encoded by means of Healthcare card code, making it possible to keep them confidential. This system has a standardized list of reasons for consultation, subject-based areas and results of the referral, thus making standardized classification and subsequent data mining possible and different types of consultation displays, so that each pharmacist can query the status of their consultations, either pending or reviewed.

Each pharmacist accesses the platform using the corporate user name and password used for the web tools in the Autonomous Community of Galicia Health System (Sergas) through the collaborative web portal of the Pharmacy Service. After registering, each user selects the source or address of the consultation, for channeling: PC to-HC consultations are sent to the pharmacist responsible for each drug therapy area at hospital (16 drug therapy areas in all and 21 pharmacists involved); and from HC to-PC, consultations are sent to the pharmacist at the Primary Care Pharmacy Units where the patient belongs (71 centers managed by 12 pharmacists).

Afterward, a new element (new consultation) must then be added, and the online form opens up (**Figure 1 and 2**) where the required information in each one of the fields must be filled in and then sent. Once the consultation has been sent, it shows up as a new message on the corporate e-mail of each pharmacist involved. Several groups and levels of pharmacists have been set for each subject area or Primary Care Pharmacy Unit.

Figure 1

Figure 2

To answer a consultation, the pharmacist must access it via the platform and after opening up the web form again, must edit it to enable the possibility of providing a reply. First of all, the users answering the consultations must identify themselves, then detail their response and the steps taken and then mark a result for the referral of the e-interconsultation from among the possible pre-programmed results or, alternatively, mark the “others” option and detail the result if it does not fit any of those listed above, then click on “reviewed” to close out the

e-interconsultation and lastly click on “send”.

A maximum 72-hour time frame was agreed for completion according to Regional Health system Regulations [12], considering that a large part of the e-interconsultations would be motivated by discrepancies on the validation of hospital prescriptions.

All of the measures can be documented by the pharmacists in the patient’s electronic medical record (IANUS®) but this process is not automatized.

3.2. Activity

16 pharmacotherapy areas were used to channel e-interconsultations directed from primary care to hospital care: cardiology and heart or vascular surgery, transplant and immunosuppression, neurology, oncology and hematology, pediatrics, internal medicine, gynecology, pneumology, clinical trials, continuous and palliative care, pharmaceutical compounding, nutrition, rheumatology, geriatrics and others. The channeling of e-interconsultations directed from hospital care to primary care was by primary care medical center. Reasons for consultation from HC to PC were standardized in: drug adherence, medication reconciliation, hospital prescriptions validation, drug interactions, off-label medications, need for drug monitoring in PC, and others; and from PC to HC were standardized in: drug adherence, medication reconciliation, drug interactions, clarification of medical prescriptions, off-label medications, authorization of prescriptions, incorrect dose and others.

2032 e-interconsultations have been made during the study period. Of them, 893 (44%) were HC to PC referrals and 1139 (56%) PC to HC. The global rate of solved e-interconsultations has been 91.7%. This rate, by care level was 85% (759) in HC to PC versus 97% (1105) from PC to HC. The rate of consultations solved within 72 hours was 66%. **Table 1 and 2** provide the main results of this study as shown in following:

Table 1: Results of e-interconsultations solved from HC to PC. n=759.

	n (%)
Reason for consultation	
• Need for drug monitoring in PC	441 (58.0)
• Medication reconciliation	129 (17.0)
• Validation of hospital prescriptions	60 (7.9)
• Drug interactions	43 (5.6)
• Off-label medications	30 (4.0)
• Drug adherence	36 (4.8)
• Others	20 (2.7)
Results	
• Drug therapy monitoring in PC	319 (42.0)
• Clarification of medical prescriptions	91 (12.0)
• Medication reconciliation	130 (17.1)
• Others	219 (28.9)

Table 2: Results of e-interconsultations solved from HC to PC. n=759

	n (%)
Reason for consultation	
• Authorization of prescriptions	476 (43.1)
• Medication reconciliation	162 (14.7)
• Incorrect dose	168 (15.2)
• Off-label medication	155 (14.0)
• Others	144 (13.0)
Drug therapy area related	
• Cardiology/heart surgery and vascular surgery	154 (13.9)
• Neurology	152 (13.8)
• Transplant-immunosuppression	139 (12.6)
• Oncology/hematology	137 (12.4)
• Pediatrics	66 (6.0)
• Internal medicine	57 (5.2)
• Gynecology	44 (4.0)
• Others	335 (32.1)
Results	
• Clarification of prescriptions	560 (50.7)
• Authorization report and/or prescriptions	193 (17.5)
• Medication reconciliation	94 (8.5)
• Off-label medication	62 (5.6)
• Change in dosage	54 (4.9)
• Others	142 (12.8)

3.3. Referrals from Hospital Care to Primary Care

Three PC pharmacists received 44% (334) of the consultations managed by way of this platform (one pharmacist 17% (129) and two pharmacists 12% (91)). The others each covered 3-5%. The major reason for consultation was the need for drug therapy monitoring in PC, followed by medication reconciliation, validation of hospital prescriptions and drug interactions. About requests, the main result was drug therapy monitoring in PC, which included patients who needed to be closely monitored by physicians. The majority of these patients were treated with narrow therapeutic index medicines e.g. antiepileptic drugs like valproic acid, phenytoin, carbamazepine or levetiracetam, antiarrhythmic drugs as digoxin or theophylline and immunosuppressant's as tacrolimus, sirolimus, everolimus or cyclosporine. The rest of the results included the need for clarification of primary care medical prescriptions, medication reconciliation between primary care medicines and medicines prescribed at hospital. Other results included dealing with off-label treatments, patients' medical education or changing the medication.

3.4. Referrals from Primary Care to Hospital Care

The 52.7% (582) of these consultations were managed by hospital pharmacists assigned to 4 pharmacotherapy areas: cardiology/heart surgery and vascular surgery, neurology, transplant-

immunosuppression and oncology/hematology. The main reason for the consultation was related to the Legal Health System of authorization of prescriptions of patients discharged from the hospital or following an out-of-hospital consultation to the in-hospital medical specialist. Other reasons for consultation were the need for medication reconciliation, especially after hospital discharge, identification of incorrect dosage or posology and identifying prescriptions of off-label medicines that needed to be dispensed by hospital pharmacists. Among the main results of the derivation of the consultation were the need for clarification of hospital prescribed medicines (posology or patient's pathology), managing authorization reports and/or prescriptions contacting with hospital care doctors, medication reconciliation, off-label medicines management and dosage changes. Other situations included a wide array of results for the consultation like changing medication, adding or withdrawing medications.

4. Discussion

Providing comprehensive care, helped by the new information technologies is among the strategic purposes of our regional healthcare system (Servizo Galego de Saúde, Sergas) [3] and also scientific societies [7]. This e-interconsultation platform has been the first electronic communication system in Spain between pharmacists of different healthcare levels [9], and afterwards different similar experiences have been shown [10,11].

In other countries, similar experiences have taken place. In England, an electronic communication system between hospital pharmacy services and community pharmacies included similar patient groups as in our study like cardiovascular illness, patients with four or more medications and/or patients who experimented changes on their treatment at hospital discharge, important critical points we also wanted to highlight [12]. In this study, authors' purpose was to follow-up those patients who might benefit after hospital discharge from better understanding of the issues related to their condition and medication. This study showed that those patients who received a follow-up consultation had lower rates of readmissions than those without it. However, we have not analyzed this outcome measure and it is an aspect that we should consider in future studies.

We believe our information system is easy to access, simple and user-friendly as all participants agreed, and most importantly, it makes it possible to normalize, standardize and document pharmaceutical interventions that take place in the patients' transitions between primary and hospital care. Our results are very similar to those previously obtained after one year and three years of the e-Interconsultation startup [9,13]. Thus, consultations from HC to PC have been mostly motivated by the need of drug monitoring at primary care of medications prescribed at hospital or interventions related to medication reconciliation. These aspects have been mainly related to medicines with narrow therapeutic index as antiepileptic drugs or digoxin or the presence of drug interactions between hospital medicines and the

patients' baseline treatment. For both items, appropriate pharmacokinetic drug monitoring of narrow index drugs such as digoxin and tracing of polymedicated patients has shown to reduce complications due to medication related problems in chronic patients [12]. This communication platform collaborates with the strategy of the Pharmacy Service of providing patients' integrated pharmaceutical care during hospital admission and after discharge [14] and is similar to other experiences that also have shown that providing integrated pharmaceutical care reduces drug related problems which are often originated during care level transitions [15].

On the other hand, consultations from primary care to hospital care have been mainly motivated by the prescription of new medicines at hospital or for the monitoring of the immunosuppression in transplanted patients.

The main limitation of this e-Interconsultation platform is that consultations are kept in an isolated web portal and are not integrated in patients' electronic medical records unless the pharmacist report it manually. For this reason, the e-interconsultations can only be consulted by HC or PC pharmacists but not by other professionals who also provide patients healthcare like physicians or nursing. Integrating the report of the e-interconsultations in patients' medical records in an automatically way is an aspect that in our opinion would improve the utility of this communication platform. Nowadays, the computer application where patients' medical data are recorded (IANUS[®]) only allows communications from PC to HC but does not allow to make consultations from HC to PC; that is the main reason why we prefer this bidirectional e-interconsultation platform rather than IANUS[®], which is being used now by other hospitals in our region [10].

The global rate of solved e-interconsultations has been similar to other experiences [10] but if we analyze the e-interconsultations from HC to PC, this level needs to be improved. Another aspect that should be better in our opinion is the rate of responding in 72 hours or less period, which we consider, should be higher. Among the causes of responding delay and unsolved consultations are forgetting to close the e-interconsultation (need to click the consultations as "solved"), and absence of the assigned pharmacist (for example during holiday periods). We believe that responding on time is the major aspect on which we should work, and it is necessary to make organizational efforts in order to improve it. More involvement of PC pharmacists on patients' medication management improves health outcomes as some studies have shown [16-20].

5. Conclusions

We consider that this web platform of communication constitutes a valid system of communication between professionals allowing pharmacists to solve medication problems.

This electronic communication system facilitates pharmaceutical care focused on the patient and it also makes it possible to normalize, standardize and register consultations keeping patients' confidentiality. Therefore, it helps us to provide better quality pharmaceutical care to our patients and promotes the rational use of medicines in our healthcare environment.

In addition, this study shows that the major reasons for making a consultation in our health area are the need for drug monitoring at primary care, problems related to the authorization of hospital drug prescriptions and the need for medication reconciliation in both healthcare levels achieving better quality pharmaceutical care..

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