Staff team perceptions of the Maltese outpatient parenteral antimicrobial therapy service

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ABSTRACT

The outpatient parenteral antimicrobial therapy (OPAT) service was developed to cater for hospitalised patients receiving antimicrobial treatment and who are stable enough to be discharged to an outpatient or home setting. The authors have used the Systems Engineering Initiative for Patient Safety (SEIPS) 2.0 as a framework for exploring OPAT performance in the Maltese context. This study investigated the perceptions of the system from the perspective of the OPAT staff. Analysis of the output from a focus group was mapped onto the SEIPS 2.0 framework in order to identify and assess how OPAT work system factors interacted to produce outcomes. Thematic analysis allowed key interactions to be explored. Four key themes were identified: the referral process, training and education, trust and service expansion. Combined with output from a future study phase exploring the patient experience, it is envisaged that these findings will assist in future intelligent redesign of the service.

KEYWORDS

Human factors; SEIPS 2.0; OPAT

Introduction

Outpatient parenteral antimicrobial therapy (OPAT) is defined as "the administration of at least two doses of parenteral antimicrobial therapy on different days without intervening hospitalisation" and, as a service, has been developed in order that patients who are otherwise stable and are in hospital for the sole purpose of receiving their antimicrobial treatment can be discharged to an outpatient or home setting. Since its inception in 1974, OPAT has evolved and expanded globally, and it appears a key driver of this expansion is the perceived cost benefit, because it is generally considered that the costs of the outpatient or home models compares favourably with the cost of an inpatient stay. However, a consideration of the literature suggests that costing OPAT is complex, and there are not internationally standardised methods for doing so, which makes review of such claims difficult. However, the financial aspect is only one dimension of the potential benefits OPAT has to offer. User satisfaction is an important quality outcome indicator that to date remains under-investigated (Berrevoets et al., 2018; Twiddy et al., 2018).

OPAT can be considered a complex sociotechnical system and, as such, user satisfaction can be viewed as an emergent outcome. The Systems Engineering Initiative for Patient Safety (SEIPS) 2.0 has been shown by the authors of this current study to be a suitable model for investigating work system factors and interactions that contribute to outcomes (Bugeja et al., 2019). SEIPS 2.0 is a

conceptual framework which places users at its centre, supporting the design (or redesign) of a work system which supports both user wellbeing and performance (Holden et al., 2013). Within this model, interactions between the work system entities can be viewed as inputs, which are transformed by human performance to yield outputs (including those related to safety). SEIPS 2.0 considers these transformations through different lenses, dividing them into categories of 'professional-only', 'patient-only' and 'patient/professional collaborative work'. Patients (and carers) play an unusually active role within the OPAT system, and the recognition of 'patient' and 'patient-professional' work can be particularly useful.

In Malta, the visiting nurse OPAT model was launched in October 2016 with the aim of providing an outpatient administration service of intravenous antimicrobials to stable patients at their place of residence. These were patients who had been initially admitted to the national acute hospital in Malta (Mater Dei Hospital) for antimicrobial therapy. Once a patient was flagged as a potential candidate for the service, the designated OPAT team evaluated the eligibility of the patient for enrolment. The responsibilities of this team included booking an appointment for the patient to undergo insertion of an appropriate vascular access device, choosing the appropriate antimicrobial treatment, screening the patient for methicillin-resistant staphylococcus aureus (MRSA) (important in deciding the treatment strategy) and providing an education package for the patient prior to their discharge to the home setting. At home, patients received daily visits by the OPAT nurses for treatment administration, and in the event of a complication, the nurse would also be able to arrange readmission to hospital.

As OPAT services continue to expand worldwide more work is needed, both to improve international understanding of how well or otherwise OPAT compares to existing inpatient antimicrobial therapies, but also to support evidence-based optimisation strategies to maximise benefits. Individual OPAT services are highly context-specific, and systems frameworks such as SEIPS 2.0 offer a common frame of reference for service providers to share data about their own systems. The authors are aware that human factors approaches for understanding OPAT are beginning to gain traction (Keller et al., 2016; 2019), but believe this current study is unique in reporting SEIPS 2.0-derived data regarding the Maltese context. In exploring interactions between system entities that give rise to outcomes, data needs to be collected from multiple sources, and one crucial element is the lived experience of the users (Holden et al., 2013). This current study follows on from previous work by the authors, which began with a systematic review of the OPAT literature. The papers selected for review were considered to be work-as-reported and therefore the data extraction and synthesis phases were carried out using SEIPS 2.0 as a framework (Bugeja et al., 2019). One of the main outcomes of this study was the observation that the referral process appeared critical to the overall success of all OPAT services. Furthermore, training and education could be seen to be a key interaction in respect of this referral process. OPAT in Malta is a new service offered by the hospital and therefore the referral process was new to all staff. Any human factors approach involves collecting data to capture the experience of the system from the perspective of all stakeholders, and this is the aim of a larger study being undertaken by the authors. Reporting on the patient experience is not yet complete – this is a much more complex aspect. The aim of the part of the study reported here was to capture the perspective of the Maltese OPAT team staff members, using a focus group approach to collect qualitative data to see if the findings of the systematic review and SEIPS 2.0 analysis hold true for the Maltese context.

Method

Setting

The visiting nurse OPAT service, Mater Dei Hospital, Malta

Inclusion criteria

Purposive sampling targeted all staff directly involved in OPAT development, implementation and provision.

Recruitment

Recruitment was via electronic mail to all ten members of the OPAT team. Date and time for the focus group were established through consensus to maximise attendance. Written consent was obtained from each participant and a code assigned to each to preserve anonymity.

Data collection tool design

Human factors approaches are essentially constructivist in nature, incorporating theoretical perspectives assuming self, society and reality are constructs developed through interaction, relying on communication, language and the extent to which it is shared. In modelling systems, it is recognised that there is no one true system, and the aim is therefore to achieve a working model that can be used as a basis for shared understanding and improvement. The interactive nature of focus groups allows these different perspectives to be explored. A discussion guide was developed (informed by the results of the systematic review phase) to promote discussion in relation to constructive service improvement. The focus group was recorded and transcribed verbatim. Demographic data were also collected.

Data analysis

The transcript was imported into NVivo® version 11 to support thematic analysis. The SEIPS 2.0 model was used to identify interactions between work system entities that were likely to have a significant impact on outcomes, including safety. Identifying interactions that underpin both good and poor outcomes is important for intelligent system redesign. Nodes were therefore predefined using SEIPS 2.0 categorisations as a priori codes. Open axial coding allowed identification of sub codes and the final themes.

Results

The mapping of the OPAT system (as described from the perspective of the nine staff users who were able to participate) on to the SEIPS 2.0 framework can be seen in Table 1 below. For clarity, a summary of the SEIPS 2.0 framework is shown in Figure 1.

Table 1: Elements of the OPAT work system (as described by staff users) mapped onto the SEIPS 2.0 framework.

Work system factors
Person factors
• Healthcare professionals' ability to work in a multidisciplinary team. • OPAT team's ability to liaise with lay people, for example the patient, informal health caregiver etc. • OPAT nurse's ability to singlehandedly provide service in patients' residence. • Apparent lack of adherence by non-OPAT staff to the referral process.
Task factors
• The need to assess patients for eligibility. • The need to train new OPAT recruits about the service.

- Recognition of the need to train referring consultants about the service's referral procedures.
- Additional workload generated by failure to follow referral process.
- The need for staff training re: new administration technologies or antimicrobials.

Tools and technology factors

- Availability of new antimicrobials for use through OPAT.
- Availability of new technology for drug administration, for example an elastomeric pump.
- Lack of awareness of tools to support the referral process.

Environment

- The service is being delivered in a non-healthcare environment.
- The impact of patients' comorbidities on their ability to manage at home, for example mobility.
- The need to educate patients about the impact of the environment on treatment success.
- The availability of informal health caregiver support.

Organisational factors

- Timely allocation for patient education and reassurance prior to discharge from hospital.
- Standardised recruitment training programs for new OPAT team members.
- Timely MRSA screening and decolonisation prior to discharge from hospital.
- Promotion of OPAT service through marketing schemes.

Processes

- Selecting patients against standardised criteria.
- Referring patients to the OPAT service.
- Providing training and education to all healthcare professionals involved in the management of the enrolled patient.
- Ensuring care quality throughout OPAT service delivery.

Patient outcomes

- Selection of the correct patient.
- Patient satisfaction.
- Cure rates.
- Readmission rates.

Professional outcomes

- Achieving an acceptable level of security at patients' residences prior to discharge.
- High care quality through standardised training procedures.
- Selection of the correct patient.
- Flexible OPAT teamwork schedules to cater for increased service demands.

Organisational outcomes

- Impact of new drug administration technologies on OPAT team practice.
- Impact of timely referrals on MRSA screening and decolonisation prior to patient discharge.
- Impact of maximal capacity of the service on future referrals.
- Impact of improved technology on introduction of new OPAT models, for example self-administration.
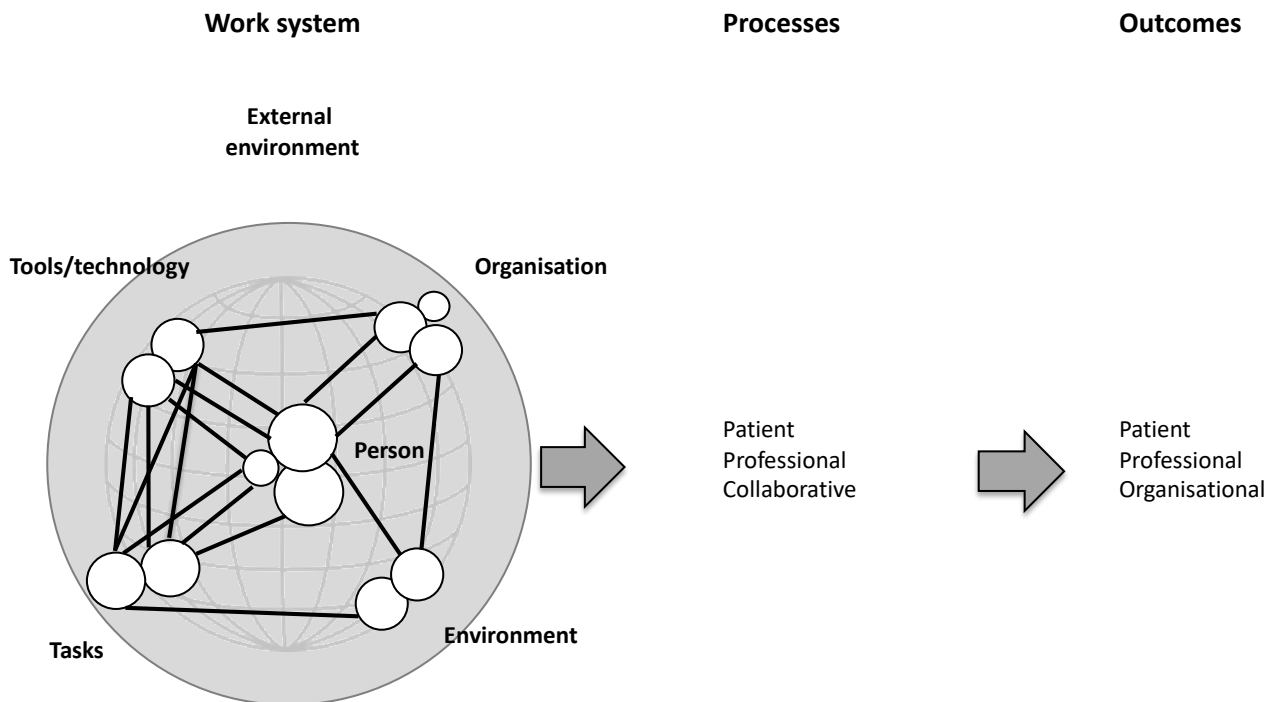
Work system   **Processes**   **Outcomes**

Figure 1: Schematic representation of the Systems Engineering Initiative for Patient Safety (SEIPS 2.0) framework (from Holden et al., 2013).

Key interactions

Factors relating to aspects of the referral process appeared across the work system, and a complex pattern of interactions was observed. For example, the lack of adherence to the expected referral process not only increased the workload of the OPAT team, but also impacted negatively in terms of the time available to educate and reassure the patient, two key factors likely to influence patient satisfaction with the service. It also reduced the time available for ensuring that the patient's home environment was suitable to be used as an alternative healthcare facility as well as for scoping out potential informal caregiver support and developing the rapport required to enable effective nurse-patient collaborative work. The scale of the ramifications following poor referral practice clearly led to feelings of frustration within the OPAT team.

Similarly, factors relating to training and education appeared across the entire system. Training and education for all professionals, patients and informal caregivers were particularly important in underpinning successful OPAT outcomes.

Discussion

An exhaustive discussion of all the emergent themes is beyond the scope of this paper. However, based on frequency and on the perceived importance to the research aims, the following themes were considered the most critical:

Theme 1: The critical importance of the referral process

"[better to] make it grow slowly and effective[ly] rather than quickly and disastrous[ly]" HCP03

Ensuring the right patients are selected for OPAT was seen to depend heavily on the quality of the referral process. Referrals to the service have actively been encouraged by the OPAT team, as

demonstrated by the significant investment in marketing and other awareness-raising activities described by staff. While referral frequency is a key performance indicator, the consensus was that smooth management through adherence to a standardised practice was desirable if detrimental outcomes were to be avoided. This resonates with findings across the literature that confirm that sound referral processes are critical to success (Bugeja et al., 2019). The participants highlighted several elements which, through their interaction, can hinder the desired outcomes of the service. A decision to refer a patient for consideration as an OPAT candidate requires a decision-making process by the referring consultant. This is then ratified (or not) by the completion of the referral process and acceptance onto the service by the OPAT team. Variability in the understanding of the referring team meant that sometimes OPAT staff had very little warning that they may be receiving a patient. The reduced run-in time impacted on opportunities for education and reassurance of the patient (both in terms of their vascular access device and their management of any comorbidities). Other tasks needing to be carried out in this shortened timeframe included the screening for MRSA infection, the assessment of the home environment, the availability of informal care support, the verification of stock availability and the level of patient mobility at home. With an appropriate allocated timeframe, these tasks can be duly performed, and the necessary arrangements settled prior to discharging a patient, for example amending the patient's home environment, catering for home support and envisaging service provision during public holidays and weekends.

Furthermore, short notice of incoming referrals impacted on the workload of staff, sometimes to the point that the referral would have to be refused. There was a strong perception from the OPAT team that the ramifications of this extended beyond the patient refused discharge to the service – it was agreed that such a refusal would likely impact the future referring behaviour:

"... [if we] then disappoint [the referring consultant] by telling him we cannot offer this service, that will mean the consultant won't call again most of the time…" HCP07

It was also recognised that the interaction between referrals and the marketing strategy was critical – staff were very keen to see the service grow and expressed satisfaction with the substantial increase in numbers seen over the first years of the service. The marketing strategy was seen as contributing to the rate of referrals (and therefore desirable), but it was noted that this occasionally resulted in the service being overwhelmed and patients could not be accepted (a suboptimal outcome). Another person factor considered to impact on the referral process was the understanding of the OPAT service by the referring teams. A lack of understanding (considered usually to result from a lack of experience) made referrals less likely, as well as impacting on their quality:

"I feel that teams who are using our service more frequently for example the vascular teams, they know very well how to do it, they do it in a timely fashion, because they got used to it. Then there are those teams who have seldom done it like orthopaedic teams and so they might know less how to go about it, they leave it till the last minute, and they don't call the right people." HCP08

These factors could be seen to link clearly with the training and education provided for OPAT users.

Theme 2: Training and education

The OPAT service is a challenging environment for both staff and patients. From a staff perspective, the ability to function as part of a complex multidisciplinary team is key to success. The team must be empowered to make decisions whilst being careful to remain within its scope of practice. Considering the OPAT model under study (visiting nurse model), certain pertinent decisions occurred at the patient's residence (the interface between the patient and the service) thus making the OPAT nurses instrumental in the decision-making process. The training and education offered by the OPAT team was important in producing qualified recruits, and therefore better

distribution of workload. This led to an increase in maximum service capacity but was also considered to ensure a high standard of care. The need to provide a standard of care equivalent to the hospital setting was acknowledged by the participants, who seemed content that such a standard was being achieved across all staff members, as evidenced by patients being happy to accept treatment from any nurse:

"...in fact, that came across in the satisfaction questionnaire, whereby the patients were not affected by the fact that nurses kept changing from day to day. Given the option, that was one of the questions that was asked, did you want the same person to see you throughout starting from preadmission and the patients said that it made absolutely no difference." HCP07

It was also clear that staff felt that many of the problems expressed in relation to the referral process could be ameliorated by education and/or training, but there was also a recognition that 'learning on the job' while slow, was eventually effective:

"[...knowledge] kind of trickles down and eventually this is a learning experience for everyone so it's very understandable that they kind of...it's not something they do every day." HCP08

Education was also seen clearly as part of healthcare-professional collaborative work (Holden et al., 2013), particularly in relation to optimising the suitability of their home environment. This resonates with the findings by Keller and colleagues (2019) that hazards in the home environment have significant potential for harming OPAT patients and that education is an essential part of the approach here. This is – at least in part – because in the absence of any formal guidance, patients were seen to develop their own strategies to mitigate hazards, and these were not always effective (and even introduced new hazards). Their suggestion is that any education strategy should equip patients with the skills to identify hazards and manage the risks associated with them.

Theme 3: Trust

Due to the interdisciplinary liaisons the OPAT team must maintain for efficient running the service, it was perhaps not unexpected that the level of trust was a recurrent theme throughout the discussion. This theme was prevalent in the relationships between the OPAT team and the referring teams, the general practitioner and most importantly with the patient. Considering patients are mostly in contact with the OPAT nurses during visits, discussions revolved around the level of trust in that relationship and how this in turn positively influenced the patient's morale and belief in their capability to manage their condition at home and this was seen to positively influence the preparation of the administration area prior to the home visit.

Theme 4: Future expansion and development of service

The final theme revolved around the service's expansion. Discussions took into consideration the introduction of medications with longer dosing regimens and more efficient administration tools and technologies, for example elastomeric pumps (a more sophisticated administration device) which would in turn aid staff work distribution and patient acceptance. Another potential avenue which arose in relation to service expansion was the introduction of the self-administration model. The other themes (particularly referral and education) were considered to play an important part in ensuring its success.

Conclusion

SEIPS 2.0 supported identification of system factors contributing to OPAT outcomes. Thematic analysis revealed key interactions between factors which strongly influenced the quality of processes and outcomes. Perhaps the most significant finding was the extent to which the referral mechanism had pan-system effects, strongly influencing the perceived quality of the service. In

turn, this impacted on staff and patient satisfaction. This has identified a useful starting point for system redesign, and the next stage will involve task analysis to more objectively capture the variation in the referral process suggested in this study. It is also recognised that the patient (and other user) experience will be an essential part of any system redesign and this will be the subject of the next phase of the study.

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