Int J Clin Pharm (2012) 34:569–578
DOI 10.1007/s11096-012-9645-z

RESEARCH ARTICLE

Exploring the role of renal pharmacists in outpatient dialysis centres: a qualitative study

Teresa M. Salgado · Rebekah Moles · Shalom I. Benrimoj · Fernando Fernandez-Llimos

Received: 29 December 2011 / Accepted: 14 April 2012 / Published online: 27 April 2012

Abstract *Background* Pharmacists' involvement in outpatient dialysis centres in Australia is currently limited, despite the positive contribution of pharmacists to renal patients' medication management and health outcomes outlined in the literature. An expanded role for pharmacists in this setting may be required as a consequence of the increasing burden of renal disease in the population. *Objective* To explore renal-specialised hospital pharmacists' intentions to implement pharmacy services in outpatient dialysis centres. *Setting* Australian renal-specialised hospital pharmacists. *Method* Semi-structured interviews were conducted with a purposeful sample of renal pharmacists recruited through the Society of Hospital Pharmacists of Australia Renal Special Interest Group. The interview guide was developed based on the theory of planned behaviour. To identify behavioural intention, the three components of the theory—attitudes, subjective norm, and perceived behavioural control—were explored. The interviews were recorded, transcribed verbatim, and thematically content analysed following a qualitative approach. *Main Outcome Measures* Pharmacists' views on their potential involvement and perceived ease or difficulty in implementing pharmacy services in outpatient dialysis centres. *Results* Thirteen renal pharmacists were interviewed until data saturation achievement. The following services for this setting were suggested: medication reconciliation, medication review, patient education, promotion of compliance, involvement in protocol development with subsequent anaemia/phosphate management. Pharmacists demonstrated positive attitudes towards the implementation of the services. Outcomes expected included benefits to patients, the renal team, and the pharmacy profession, as well as economic savings due to dose optimisation and improvement of patients' adherence. Subjective norm was favourable meaning that nephrologists, nurses and patients were expected to be receptive towards future pharmacy services. Barriers pointed out for the implementation comprised: funding, hospital administrators' approval, time and staff shortage, academic training, relationship with physicians, and attitudes of pharmacists, renal team, and patients. Facilitators mentioned by respondents included: having an interview room with access to information sources, consent from the team, access to patients' profiles, and a full-time pharmacist with a clearly defined role. *Conclusion* Pharmacists showed positive attitudes, favourable subjective norm and strong perceived behavioural control, which originated a clear behavioural intention to develop pharmacy services in outpatient dialysis centres. The potential barriers and enablers outlined should be taken into account, as well as the holistic approach for the successful implementation of cognitive pharmacy services.

T. M. Salgado
Research Institute for Medicines and Pharmaceutical Sciences (iMed.UL), Faculty of Pharmacy, University of Lisbon, Lisbon, Portugal

R. Moles
Faculty of Pharmacy, University of Sydney, Sydney, NSW, Australia

S. I. Benrimoj
Graduate School of Health, University of Technology Sydney, Sydney, NSW, Australia

F. Fernandez-Llimos (✉)
Department of Social Pharmacy, Faculty of Pharmacy, Research Institute for Medicines and Pharmaceutical Sciences (iMed.UL), University of Lisbon, Avda. Prof. Gama Pinto, 1649-019 Lisbon, Portugal
e-mail: f-llimos@ff.ul.pt

Keywords Australia · Haemodialysis centres · Outpatients · Pharmacists · Qualitative research · Theory of planned behaviour

Impact of findings on practice

- Australian renal-specialised hospital pharmacists appear to be very confident with regards to a future provision of pharmaceutical services in outpatient dialysis centres and would be ready to take up this role when the opportunity arises.
- A list of specific pharmaceutical services, coincident with published literature, is available in outpatient dialysis centres.
- In areas where collaboration between pharmacists and physicians is less common, pharmacists may have to be more proactive in showing how they can contribute to patient care and initially focus on relationship building prior to the implementation of new services.

Introduction

Evidence from the literature demonstrates that pharmacists contribute to improved patient outcomes in conditions such as diabetes, hypertension, hyperlipidemia [1], heart failure [2], and depression [3]. The role of the pharmacist in servicing patients with chronic kidney disease has been analysed in two recent systematic reviews [4, 5]. Pharmacist intervention contributed to reductions in hospitalisations and cumulative time spent in hospital for patients undergoing haemodialysis [6], and reduced the relative risk for end-stage renal disease and all-cause death in patients with type 2 diabetic nephropathy [7]. Additionally, phosphate [8] and anaemia management [9] were also improved after the implementation of protocols by pharmacists. Despite some studies highlighting the positive impact pharmacists can have for patients with chronic kidney disease, other studies showed no impact of pharmacists [4]. The extent to which pharmacists' services are directed to these patients may be a determinant of the outcomes obtained by patients.

The implementation of cognitive pharmacy services, also referred to as clinical pharmacy services or pharmaceutical care services, in general is complex and several models and frameworks for change management have been employed by researchers and practicing pharmacists to embrace the expansion and evolution of the pharmacists' role [10]. Research has provided insight into barriers and facilitators of the implementation process, mostly at the community level [11–14]. Practice change has been predominantly investigated under two perspectives: behavioural change theories [15, 16], and management theories [17, 18]. It has been suggested that a holistic and integrated approach should be adopted in order to ensure the successful implementation of pharmacy services [19]. This includes things such as making sure all stakeholders involved in the change have their part to play, as well as aspects to do with the physical environment and adequate resources.

The theory of planned behaviour [20] has been applied to health care research to predict health care professionals [21–24] and patients' behavioural change [25]. The theory explains and attempts to predict human behaviour based on the combination of three components: attitudes, subjective norm, and perceived behavioural control. These components determine the behavioural intention which is the immediate antecedent of behaviour. Attitudes toward the behaviour reflect an individual's positive or negative evaluation of performing the given behaviour. Attitudes are influenced by beliefs about the likely outcomes of the behaviour and the evaluations of these outcomes—behavioural beliefs. The subjective norm refers to perceived social pressure by referent individuals or groups to perform or not to perform the behaviour. The perceived behavioural control relates to the perceived ease or difficulty of performing the behaviour and it is affected by control beliefs, which refer to factors that may facilitate or impede performance of the behaviour, as well as their perceived power. According to the theory of planned behaviour, favourable attitudes and subjective norm, associated with high perceived behavioural control, predict stronger intentions to perform a given behaviour [20]. This has been corroborated in a study where more favourable attitudes and higher perceived behavioural control of renal transplant patients predicted greater intentions to adhere to the immunosuppressant therapeutic regime [25].

Aim of the study

Despite supporting evidence of the positive contribution of pharmacists to renal patients, pharmacy services implementation in dialysis centres appears to be limited. To the best of our knowledge, no study has been performed to investigate pharmacists' intentions to develop these services. Therefore, the aim of this study was to explore Australian renal pharmacists' intentions to implement cognitive pharmacy services in outpatient dialysis centres, using the theory of planned behaviour as a theoretical framework.

Methods

Participants and recruitment

This study was undertaken with renal-specialised hospital pharmacists from several States and Territories across

Australia. Prior to data collection, ethics approval was granted by the Human Research Ethics Committee at the University of Sydney (Protocol No. 13057) in September 2010. Written consent was obtained from all participants.

A purposeful sample of renal pharmacists was obtained using two sampling strategies described by Patton [26]: homogeneous and snowball/chain sampling. The sampling strategy was selected according to the objectives of the study: to explore the views of renal pharmacists regarding the future provision of services in their area of expertise (though in a different setting of outpatient rather than inpatient). These pharmacists represent information-rich cases that are able to provide the greatest insight into the research question [26]. The recruitment was mediated by the Society of Hospital Pharmacists of Australia Renal Special Interest Group and the invitation of participants was performed via e-mail or by approaching pharmacists directly during a conference.

Interview method and research instrument

This exploratory qualitative study was undertaken using semi-structured interviews with renal pharmacists conducted between October and December 2010. Where face-to-face interviews were not possible, telephone interviews were alternatively performed. A minimum of 10 participants was defined before starting the interviews, and subsequent recruitment was guided by an iterative process between the preliminary analysis of the data gathered and additional data collection [27]. Participants were continually recruited until data saturation was achieved, indicated by the redundancy of the information provided by respondents and the emergence of no new content to identified themes or additional themes [28].

The interview guide was developed based on the theory of planned behaviour [20] and thoroughly discussed by the research team until agreement with the final version. The behaviour of interest for this study was the potential implementation of pharmacy services in outpatient dialysis centres. The themes derived directly from the components of the theory and open-ended questions were designed to address those themes specifically (Table 1). Prior to enquiring about the different components of the theory, renal pharmacists' current role, attitudes towards current job, and work history and training were explored as a means of introducing the interview.

To establish face validity [29] the interview guide was pre-tested with two generalist hospital pharmacists with

Table 1 General outline of the interview guide employed to interview renal pharmacists using components of the theory of planned behaviour

Theme/component	Main question
Potential future role	What could be your potential role with haemodialysis outpatients?
Attitude toward behaviour (individual's positive or negative evaluation of self-performance of the behaviour)	Would you be willing to implement pharmacy services targeted at these patients? Why/why not?
Behavioural beliefs (individual's belief about consequences of particular behaviour)	What consequences would you anticipate (for a pharmacist) from the implementation of the services we are talking about?
Subjective norm (individual's perception of social normative pressures or relevant others' beliefs that he or she should or should not perform such behaviour)	How do you think nephrologists would see your work with haemodialysis outpatients?
	How do you think nurses would see your work with haemodialysis outpatients?
	How do you think other pharmacists would see your work with haemodialysis outpatients?
	How do you think haemodialysis outpatients would see your work?
Control beliefs (an individual's beliefs about the presence of factors that may facilitate or impede performance of the behaviour)	What would the facilitators to the inclusion of pharmacists in the renal team be?
	What would the barriers to an extended role of pharmacists in the renal team be?
	Taking into consideration the facilitators and barriers you've mentioned, which strategies could be applied to help implement these services?
Perceived behavioural control (individual's perceived ease or difficulty of performing the particular behaviour)	How difficult would it be for you to start providing pharmacy services to haemodialysis outpatients?
Behavioural intention (indication of an individual's readiness to perform a given behaviour)	Do you personally feel prepared for this challenge? Why/why not?

Table 2 Information about research participants

Reference	Years of practice as renal pharmacists	Type of hospital	State/territory
Pharm 1	7	448 bed regional tertiary referral hospital	New South Wales
Pharm 2	10	550 bed regional tertiary referral hospital	New South Wales
Pharm 3	6	975 bed metropolitan tertiary referral hospital	New South Wales
Pharm 4	20	700 bed metropolitan tertiary referral hospital	New South Wales
Pharm 5	15	340 bed metropolitan tertiary referral hospital for children	New South Wales
Pharm 6	0.7	500 bed metropolitan tertiary referral hospital	New South Wales
Pharm 7	5	197 bed regional tertiary referral hospital	New South Wales
Pharm 8	11	345 bed metropolitan tertiary referral hospital	Northern Territory
Pharm 9	4.5	600 bed metropolitan tertiary referral hospital	Australian Capital Territory
Pharm 10	5.5	650 bed metropolitan tertiary referral hospital	Southern Australia
Pharm 11	3	460 bed metropolitan tertiary referral hospital	Tasmania
Pharm 12	11	650 bed metropolitan tertiary referral hospital	Southern Australia
Pharm 13	6.5	571 bed metropolitan tertiary referral hospital	Victoria

some years of experience in the renal area. Only minor changes to how the researcher phrased the questions resulted from pre-testing.

Data analysis

The interviews were digitally recorded and transcribed verbatim. Transcripts were returned to all respondents and feedback for any misrepresentations or further clarification was sought. No significant changes or further amendments were performed by respondents to their interview transcripts. Directed content analyses were performed based on the coding frame of the interview guide [30]. Prior to analysis, the coding frame and how to interpret that data were discussed in-depth between two researchers and the coding was then carried out by one of these researchers. Since the analysis was guided by an underlying theory, the coding process began with the identification of discourse passages which fitted each component of the theory, yielding to the main themes of the analysis [30]. The next step involved clustering the passages coded for each main theme into several sub-themes. An example reflecting this process is the main theme 'control beliefs', which was grouped into 'barriers' and 'facilitators', and each of which was in turn divided into 'organisational-', 'pharmacist-', 'nephrology team-'and 'patient-related'. It is noteworthy that this was an exploratory study and not a theory-generating one. Exemplar quotes were extracted to support the analysis and to illustrate themes.

Results

Thirteen renal pharmacists were interviewed, eight face-to-face and five via telephone. Participants' age ranged from 24 to 57 years, ten (77 %) were female, and experience as a renal pharmacist ranged from 8 months to 20 years. The mean duration of the interviews was 36.30 min (range 20–70). Table 2 contains further information about research participants.

As explained by respondents, most renal pharmacists started as generalist hospital pharmacists and proceeded to specialise as a result of a personal interest in renal medicine or involvement in research projects. To date, no formal training to become a renal pharmacist exists in Australia; hence, the acquisition of knowledge comes through daily experience, conferences, continuing education, and networking with colleagues.

At present, pharmacists' involvement in the outpatient setting appeared to be limited in most cases, and restricted to when there was a special request from the dialysis centre for a specific patient.

> …if the outpatients have questions or if they specifically ask to see the pharmacist, I'll go and see them. Or if the nurses note that they're confused about their medications then I'll go and see them… (Pharm 13)

Potential future role

Renal pharmacists indicated several medication therapy management activities which would be worth performing as part of routine services in outpatient dialysis centres. These included: medication reconciliation, eliciting medication lists, and performing medication reviews. Pharmacists believed that patient education, monitoring how patients cope with their medications and strategies to improve compliance (such as suggesting or organising dose administration aids) would also be necessary services. Other

pharmacy-driven activities could comprise: therapeutic drug monitoring, monitoring patient laboratory test results, supplying drug information, writing patient education materials, providing nursing staff education, supporting prescribers regarding reimbursement requirements, advising prescribers on adequate dosing of drugs, and referring for home medicines reviews [31].

> I think there's a big role for pharmacists to be involved in assessing patients' medication history, ensuring everything's appropriate for the patient's renal function, taking into account if the medication is dialysed or not… […]…gathering an accurate and up-to-date medication history and once that's done, that provides the prescribers with what they need to make ongoing decisions. (Pharm 11)

> …home medicines review is another thing that we [renal pharmacists] could be referring patients to… […] We can do so much in the hospital setting, but sometimes I think you just need to get into the patients' home as well… (Pharm 7)

In contrast, only a few respondents believed pharmacists could be more involved in anaemia and phosphate management, either through the development of protocols or through data management (monitoring phosphate, haemoglobin, iron, and ferritin levels). One pharmacist articulated that a prescribing role could eventually arise from the implementation of these protocols.

> [Protocols are] another area in which pharmacists could be heavily involved, and potentially a prescribing role, but definitely an advice role and educating prescribers about the appropriate management of phosphate and anaemia. (Pharm 9)

Attitudes toward behaviour

Attitudes towards implementing new services were positive for all except one pharmacist. The latter expressed reticence in allocating a pharmacist exclusively to the outpatient setting as most patients were considered to be well and stable and a full-time pharmacist would be financially unpractical. This opinion contrasted with opinions from all the other respondents, who considered outpatient pharmacy services necessary and feasible. In the views of these respondents, dialysis patients were not always stable and pharmacists should play a proactive role in contributing to their optimal management.

> Just because they seem stable doesn't mean that they're on the most rational or appropriate therapy. And maybe the reason they become inpatients is because in the outpatient setting they're not being reviewed. (Pharm 11)

The fact that patients visit several specialists and the consequent increased likelihood for inappropriate medication was also acknowledged. Other arguments used to justify pharmacists' inclusion were: risk for medication misadventure, patients not seeing nephrologists very often, and nephrologists and nurses not being fully aware of patients' medication problems.

Pharmacists appeared willing to extend their services to the outpatient setting, as they acknowledged that the current model does not use the expertise of the pharmacist to address patients' needs. In addition, pharmacists were still keen to attribute key decision-making roles to physicians in the outpatient setting, but suggested a team approach to the establishment of the most suitable care plans for patients.

> I suppose the motivation would be that there is a need. And I'm not sure whether the current model, probably delivers… on the needs of the patient in terms of the expertise of a pharmacist. (Pharm 11)

> It wouldn't be that anyone would take away the decision-making role from the physicians but… you would be part of a consultation process and coming up with the best plan for the patient, based on what the patient's needs are as well. (Pharm 10)

Behavioural beliefs

Pharmacists anticipated several consequences for patients from a renal outpatient pharmacy service such as: better outcomes as a result of medication optimisation; improvement in compliance; improved safety and effectiveness of drugs; empowerment of patients about their health by increasing understanding/awareness and promoting medication management capacity; increased patient satisfaction and motivation; and the opportunity for patients to ask questions about their medication.

> …you would get a better outcome from the patients themselves because they would have their medications optimised… (Pharm 5)

One of the respondents referred to the possibility of reducing drug-related medication admissions after pharmacist intervention.

> I think it would make patients less likely to have drug-related medication admissions. I think there is a big gap in our service. (Pharm 2)

However, this opinion was not shared by another pharmacist who expressed scepticism regarding the impact on admissions and mortality.

> I think there's not a lot of evidence actually if you keep their [patients'] biochemistry right that we

> improve their mortality unfortunately. So I don't know if you could really reduce admissions on that basis. (Pharm 4)

Interviewees forecasted a number of potential consequences for the renal team after the inclusion of a pharmacist such as: relief in the team members' workload, possibility for other staff members to ask medication-related questions, change in doctors and nurses' practices, benefit for nephrologists and other health care professionals to have updated medication lists, and access to specific patient information provided by the pharmacist, such as compliance or level of education about medicines.

The impact for the pharmacy profession would be a reinforcement of pharmacists' clinical skills, as well as job satisfaction, feeling of being involved in patient care, and establishing good relationships with patients.

Finally, consequences were also expected at the economic level, as a result of dose optimisation and improvement of patients' compliance.

> Potentially, or hopefully it could reduce drug costs, because you would be able to promote more rational use of medications. (Pharm 9)

Subjective norm

Most renal pharmacists believed that nephrologists would welcome and value the services, as they are used to working in a multidisciplinary team. Acceptance would depend on the history of collaboration and nephrologists' personalities. A suggested way of improving acceptability would be presenting the pharmacist as an asset to nephrologists, rather than someone who audits their performance.

> If it's being done in a unit where there's been a long history of pharmacy services… they're more likely to respect the pharmacist and to value their opinions… If it's somewhere that doesn't have a very strong clinical pharmacy service, the nephrologists might be a little wary of what the pharmacist is going to say or whether they think that it's going to have any value. (Pharm 13)

Pharmacists perceived nurses and dialysis technicians would also be accepting, as pharmacists would help them answer questions from patients and hence facilitate their work.

Respondents believed that most patients would appreciate interacting with the pharmacist and receiving education on their medications. However, for patients not familiar with pharmacy services, "*acceptance if they haven't had many dealings with the pharmacist could be a lot different*" (Pharm 13). Nonetheless, as explained by the same pharmacist, "*once the patients could see the sort of benefits to them, then… they would have a positive sort of a response to the service*". In some cases however, pharmacists believed there would still be some patients not interested in the services.

Control beliefs

Organisational barriers mentioned were related to: lack of funding, difficulty in convincing hospital administrators, distance from the hospital to the outpatient dialysis centres, and the development and marketing of an implementation plan. Pharmacist-related barriers voiced were: lack of time, need for additional staff, need for additional academic training, and attitudes and motivations of the pharmacists (changing from a supply to a clinical role). Poor relationships with doctors or attitudes and motivations of the nephrology team and patients were in some cases also perceived as barriers.

> Academic training, I think it is a barrier… because at the moment I haven't actually found a renal specific program… and I do want to get some recognition as a renal pharmacist. (Pharm 3)

> Changing our role from delivery to clinical in some instances it is still a bit hard… if you work in a small department you've got to do the delivery first before you get out on the clinical. (Pharm 7)

Facilitators from an organisational point of view included: funding provision, an interview room with access to information sources, access to patient data and a computer program to create and print medication lists. Pharmacist-related facilitators encompassed allocating trained full-time pharmacy staff to the dialysis centre with clearly defined roles, as well as providing adequate training and coaching to pharmacists on leadership skills and how to approach nurses and physicians. Strategies including exploring pharmacists' comfort zones, concerns, knowledge gaps, time management, and level of excitement or resistance, would help to improve the capacity of pharmacists.

> One of the key enablers is you need a dedicated, permanent, stable renal pharmacist to be able to provide that service and with an appropriate level of experience and training behind them… (Pharm 12)

For some pharmacists, nephrologists were perceived as facilitators and the support from the renal team was seen as determinant for the acceptability of the services and access to patients. Additionally, giving feedback directly to health care providers would also contribute to an easier integration of the pharmacist within the team.

> If the pharmacist is there at the decision-making, which is another enabler… at the point when the prescription is being written, you are not actually telling anyone that they have done anything wrong… (Pharm 8)

Strategies proposed to facilitate the acceptance of the pharmacist encompassed: working alongside with the facilities managers and physicians, employing team building strategies, talking to stakeholders to explain the benefits of having a pharmacist in the team, and exploring the team concerns and anxieties.

> Show how clinical pharmacy services can reduce costs, can improve patient outcomes, can take work off them [physicians] which means they've got more time to do other things that they want to do, so make it into a benefit for them as opposed to a policeman role which we [pharmacists] often get. (Pharm 8)

Patient-related facilitators would include: gaining the patients' consent for pharmacy services, as well as patients having favourable attitudes towards the services. It was thought that the more time the pharmacist spent in the dialysis clinics, the easier the interactions between patients and pharmacists would become, particularly as patients are available for review or education during their dialysis time.

> [Dialysis patients] are sort of a captive audience whilst they're on dialysis… you would envisage that the pharmacist would see them during their four-hour dialysis session. (Pharm 13)

Perceived behavioural control

Perceived behavioural control expressed by most pharmacists on the implementation of the services was high. The fact that both inpatients and outpatients at the hospital were cared for by the same team would make it easier for renal pharmacists to implement pharmacy services in the outpatient setting, particularly if they already had good relationships with the renal team.

> …if you already had good relationships with your nephrologists and with your renal nurses then I think you'd have greater acceptance… (Pharm 13)

Behavioural intention

Most renal pharmacists felt they would be ready to implement pharmacy services in the outpatient setting if the opportunity arose. They did however accept the current limitations in the health system, acknowledging a lack of funding for these services and perhaps a lack of a perceived need or priority currently by administrators.

Pharmacists viewed these new services as an extension of their natural role as inpatient pharmacists, and that relationships with the rest of the team would not be an issue.

> I would have a good sort of knowledge base about that, and I would personally have good relations with nephrologists and with the key personnel within our dialysis service here. I think that they would be fairly sort of accommodating to that, and it would be a good challenge that I would be happy to take on. (Pharm 13)

> I would definitely jump at the chance of doing outpatient reviews… because it's an extension of our natural role as an inpatient pharmacist. (Pharm 2)

In contrast, one pharmacist felt she would not be able to accommodate new outpatient duties with the pre-existing inpatient and management activities.

> Me personally no, I don't think. I think I'd stay with my management role and I couldn't do both. Yeah. I don't want to give up some clinical work but I couldn't do full time. (Pharm 4)

Figure 1 summarises the interaction of the different components of the theory of planned behaviour in predicting the future provision of pharmacy services in outpatient dialysis centres.

Discussion

Australian renal pharmacists appear to have positive attitudes and favourable subjective norm with regards to the development of pharmacy services in outpatient dialysis centres. These two components, associated with a high perceived behavioural control, contributed to the strong behavioural intention identified in this sample of pharmacists. Despite the current limited involvement of pharmacists in the outpatient setting, the results of our study show that this health care group is very keen to participate and able to contribute to improved care of dialysis outpatients. Moreover this is a setting where access to patients is privileged, since each dialysis session lasts around four hours and allows a perfect opportunity for pharmacists and researchers to test new service interventions.

As polypharmacy is highly prevalent in patients undergoing dialysis [32], the contribution of pharmacists performing services such as medication review could be crucial to identify medication-related problems [33], to adjust the number of drugs prescribed [6], and to resolve drug record discrepancies [34].

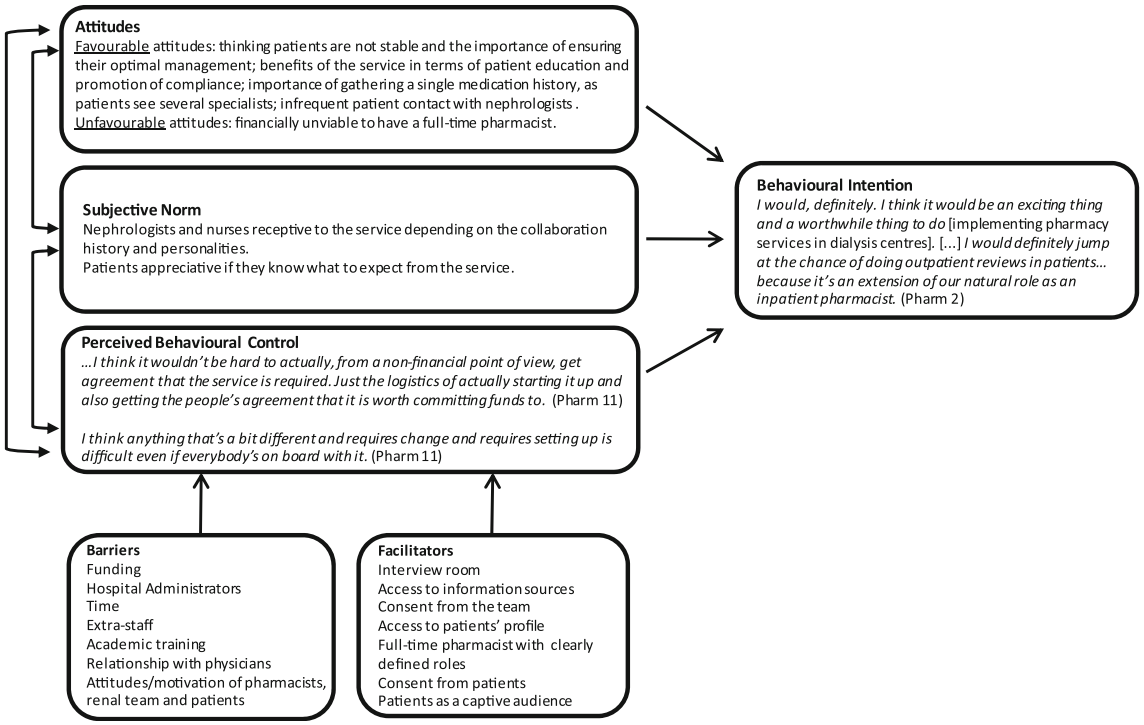

Fig. 1 Interaction of the different components of the theory of planned behaviour in predicting the future provision of pharmacy services in outpatient dialysis centres

Pharmacists expressed high motivation levels towards providing outpatient pharmacy services, considering them necessary and feasible. It appears that in this sample, at least, attitudes of pharmacists towards these new services were positive and such attitudes would not require change throughout an implementation process. Positive attitudes led pharmacists to expect positive consequences from pharmacy services implementation at clinical, humanistic, and economic levels. Consistent with these views were studies conducted with patients undergoing dialysis showing that the number of hospitalisations and cumulative time hospitalised [6], patient satisfaction [35], and overall costs [36] improved following pharmacist intervention. In addition, the presence of the pharmacist might contribute to influence physician prescribing behaviour [37] and reinforce the clinical role of the pharmacist which has been known as a long-term "dream" of the pharmaceutical profession [38].

In countries where collaboration between pharmacists and physicians is not common, shared decision-making can be an issue and subjective norm might be perceived as less favourable. In our study, however, the long history of collaboration between renal pharmacists and the nephrology team may simplify the implementation process and minimise barriers related to attitudes of nephrologists and the renal team. Indeed, previous studies reported that physicians see pharmacists as a reliable source of information [39], feel comfortable with pharmacists providing patient education about medicines [39], and value complete patient medication lists provided by pharmacists [40]. In addition, other studies reported that patients recognise the expertise of pharmacists in the chemistry of medicines and acknowledge the quality of the information provided [41]. For this reason, pharmacists in dialysis centres could complement some of the community pharmacists' activities such as: helping with medicines management, promoting compliance, educating about medication and lifestyle changes, and providing minor ailment advice.

This study did however reveal some perceived barriers to service implementation. For participants in our study, lack of time was seen as a barrier because they were full-time hospital pharmacists with a multitude of functions. A way to overcome some of the barriers pointed out by respondents would be allocating pharmacists to exclusively work in outpatient dialysis centres with clearly defined roles, since role clarity is vital for effective teams [42]. Another strategy to overcome barriers would consist of reengineering the Pharmacy Department's *modus operandi* to allow more efficient use of pharmacists' time and the shift from a delivery to a clinical role. To achieve this goal, pharmacists will need to provide evidence to hospital administrators that their interventions are cost-effective and contribute to improved patient outcomes.

However, individual skills or knowledge and attitudes of pharmacists alone will not produce the changes required to

implement a service [10]. For a new service to be implemented and practice change to be a reality, internal and external organisational factors, as well as marketing strategies and financial support, need to be taken into account during the implementation process [10]. This study is the initial step in assessing pharmacists' intentions to develop pharmacy services in outpatient dialysis centres, but a holistic and integrated approach should be adopted for successful service implementation [19].

While participants provided extremely rich information resulting in very insightful interviews, this study presents some limitations. First of all, the interviews were conducted with experienced Australian renal pharmacists, which may limit the generalisability of the results to other countries where pharmacists have no intensively specialised roles. Secondly, data saturation is a theoretical concept [28] and for that reason the chance of misinterpretation of the saturation point should be acknowledged. Thirdly, social desirability and the high motivation of participants may have contributed to the achievement of extremely positive responses. Finally, although the coding frame and process were discussed in-depth between two researchers, the analysis was performed by one single researcher. However, this was an exploratory study whose main goal was to identify pharmacists' intentions to provide pharmacy services in dialysis centres.

Conclusion

Australian renal pharmacists had a positive view about the opportunity to extend pharmacy services into outpatient dialysis centres. They felt that there was some necessity in utilising their expertise in this setting to address dialysis patients' medication needs. Pharmacists interviewed manifested strong perceived behavioural control and high behavioural intention, suggesting they would be ready to implement pharmacy services in this setting, provided with the facilitators outlined.

In future research, nephrologists, nurses, and patients' views on the future involvement of pharmacists in this setting should be explored to assess the level of acceptance of the services.

Acknowledgments We would like to acknowledge the invaluable contribution of Dr. Eleonora Feletto in the development of the interview guide and pre-testing of the research instrument. In addition, we would like to thank all the renal pharmacists who participated in this study for sharing their views and experiences.

Funding Financial support received from *Fundaçao para a Ciencia e a Tecnologia*, Ministry of Education and Science, Portugal (Doctoral Grant reference number SFRH/BD/43999/2008).

Conflicts of interests None to declare.

References

1. Chisholm-Burns MA, Kim Lee J, Spivey CA, Slack M, Herrier RN, Hall-Lipsy E, et al. US pharmacists' effect as team members on patient care: systematic review and meta-analyses. Med Care. 2010;48(10):923–33.
2. Koshman SL, Charrois TL, Simpson SH, McAlister FA, Tsuyuki RT. Pharmacist care of patients with heart failure: a systematic review of randomized trials. Arch Intern Med. 2008;168(7):687–94.
3. Boudreau DM, Capoccia KL, Sullivan SD, Blough DK, Ellsworth AJ, Clark DL, et al. Collaborative care model to improve outcomes in major depression. Ann Pharmacother. 2002;36(4):585–91.
4. Salgado TM, Moles R, Benrimoj SI, Fernandez-Llimos F. Pharmacists' interventions in the management of patients with chronic kidney disease: a systematic review. Nephrol Dial Transplant. 2012;27(1):276–92.
5. Stemer G, Lemmens-Gruber R. Clinical pharmacy activities in chronic kidney disease and end-stage renal disease patients: a systematic literature review. BMC Nephrol. 2011;12(1):35.
6. Pai AB, Boyd A, Depczynski J, Chavez IM, Khan N, Manley H. Reduced drug use and hospitalization rates in patients undergoing hemodialysis who received pharmaceutical care: a 2-year, randomized, controlled study. Pharmacotherapy. 2009;29(12):1433–40.
7. Leung WY, So WY, Tong PC, Chan NN, Chan JC. Effects of structured care by a pharmacist-diabetes specialist team in patients with type 2 diabetic nephropathy. Am J Med. 2005;118(12):1414.
8. Yokum D, Glass G, Cheung CF, Cunningham J, Fan S, Madden AM. Evaluation of a phosphate management protocol to achieve optimum serum phosphate levels in hemodialysis patients. J Ren Nutr. 2008;18(6):521–9.
9. Bucaloiu ID, Akers G, Bermudez MC, Mainali R, Brown BL, Roberts SS, et al. Outpatient erythropoietin administered through a protocol-driven, pharmacist-managed program may produce significant patient and economic benefits. Manag Care Interface. 2007;20(6):26–30.
10. Roberts AS, Benrimoj SI, Chen TF, Williams KA, Aslani P. Implementing cognitive services in community pharmacy: a review of models and frameworks for change. Int J Pharm Pract. 2006;14(2):105–13.
11. Gastelurrutia MA, Fernandez-Llimos F, Benrimoj SI, Castrillon CC, Faus MJ. Barriers for the implementation of cognitive services in Spanish community pharmacies. Aten Primaria. 2007;39(9):465–70.
12. Roberts AS, Benrimoj SI, Chen TF, Williams KA, Aslani P. Implementing cognitive services in community pharmacy: a review of facilitators used in practice change. Int J Pharm Pract. 2006;14(3):163–70.
13. Roberts AS, Benrimoj SI, Chen TF, Williams KA, Aslani P. Practice change in community pharmacy: quantification of facilitators. Ann Pharmacother. 2008;42(6):861–8.
14. Rossing C, Hansen EH, Krass I. Barriers and facilitators in pharmaceutical care: perceptions and experiences among Danish community pharmacies. J Soc Admin Pharm. 2001;19(2):55–64.
15. Saini B, Krass I, Armour C. Specialisation in asthma: current practice and future roles. J Soc Admin Pharm. 2000;18(5):169–77.
16. Farris KB, Schopflocher DP. Between intention and behavior: an application of community pharmacists' assessment of pharmaceutical care. Soc Sci Med. 1999;49(1):55–66.
17. Feletto E, Wilson LK, Roberts AS, Benrimoj SI. Flexibility in community pharmacy: a qualitative study of business models and cognitive services. Pharm World Sci. 2010;32(2):130–8.

18. Roberts AS, Benrimoj SI, Chen TF, Williams KA, Hopp TR, Aslani P. Understanding practice change in community pharmacy: a qualitative study in Australia. Res Social Adm Pharm. 2005;1(4):546–64.
19. Benrimoj SI, Feletto E, Gastelurrutia MA, Martinez Martinez F, Faus MJ. A holistic and integrated approach to implementing cognitive pharmaceutical services. Ars Pharm. 2010;51(2):69–87.
20. Ajzen I. The theory of planned behavior. Organ Behav Hum Decis Process. 1991;50:179–211.
21. Herbert KE, Urmie JM, Newland BA, Farris KB. Prediction of pharmacist intention to provide Medicare medication therapy management services using the theory of planned behavior. Res Social Adm Pharm. 2006;2(3):299–314.
22. Perkins MB, Jensen PS, Jaccard J, Gollwitzer P, Oettingen G, Pappadopulos E, et al. Applying theory-driven approaches to understanding and modifying clinicians' behavior: what do we know? Psychiatr Serv. 2007;58(3):342–8.
23. Gavaza P, Brown CM, Lawson KA, Rascati KL, Wilson JP, Steinhardt M. Examination of pharmacists' intention to report serious adverse drug events (ADEs) to the FDA using the theory of planned behavior. Res Social Adm Pharm. 2010;7(4):369–82.
24. Rashidian A, Russell I. Intentions and statins prescribing: can the theory of planned behaviour explain physician behaviour in following guideline recommendations? J Eval Clin Pract. 2011; 17(4):749–57.
25. Chisholm MA, Williamson GM, Lance CE, Mulloy LL. Predicting adherence to immunosuppressant therapy: a prospective analysis of the theory of planned behaviour. Nephrol Dial Transplant. 2007;22(8):2339–48.
26. Patton MQ. Qualitative evaluation and research methods. 2nd ed. Newbury Park, CA: Sage; 1990.
27. Cohen D, Crabtree B. Qualitative research guidelines project. Available from: http://www.qualres.org/index.html. Cited 28 Dec 2011.
28. Bowen GA. Naturalistic inquiry and the saturation concept: a research note. Qual Res. 2008;8(1):137–52.
29. Whiteley AM, Whiteley J. The familiarization study in qualitative research: from theory to practice. Qual Res J. 2006;6(1): 69–85.
30. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res. 2005;15(9):1277–88.
31. Commonwealth of Australia, The Pharmacy Guild of Australia. The fifth community pharmacy agreement between the Commonwealth of Australia and the Pharmacy Guild of Australia. 2010 [cited 7-Sep-2011]; Available from: http://www.health.gov.au/internet/main/publishing.nsf/Content/C3DB799DB360AF0CCA25772000249FA8/$File/5CPA%20Agreement%2005%20August%202010.pdf.
32. Manley HJ, Garvin CG, Drayer DK, Reid GM, Bender WL, Neufeld TK, et al. Medication prescribing patterns in ambulatory haemodialysis patients: comparisons of USRDS to a large not-for-profit dialysis provider. Nephrol Dial Transplant. 2004;19(7): 1842–8.
33. Grabe DW, Low CL, Bailie GR, Eisele G. Evaluation of drug-related problems in an outpatient hemodialysis unit and the impact of a clinical pharmacist. Clin Nephrol. 1997;47(2): 117–21.
34. Manley HJ, Drayer DK, McClaran M, Bender W, Muther RS. Drug record discrepancies in an outpatient electronic medical record: frequency, type, and potential impact on patient care at a hemodialysis center. Pharmacotherapy. 2003;23(2):231–9.
35. Mirkov S, Ball P. Design and pilot of a medication review clinic in a dialysis centre. J Pharm Pract. 2003;33(3):199–203.
36. Quercia RA, Abrahams R, White CM, D'Avella J, Campbell M. Cost avoidance and clinical benefits derived from a pharmacy-managed anemia program. Hosp Pharm. 2001;36(2):169–75.
37. Sulick JA, Pathak DS. The perceived influence of clinical pharmacy services on physician prescribing behavior: a matched-pair comparison of pharmacists and physicians. Pharmacotherapy. 1996;16(6):1133–41.
38. Hepler CD. A dream deferred. Am J Health Syst Pharm. 2010;67(16):1319–25.
39. Tahaineh LM, Wazaify M, Albsoul-Younes A, Khader Y, Zaidan M. Perceptions, experiences, and expectations of physicians in hospital settings in Jordan regarding the role of the pharmacist. Res Social Adm Pharm. 2009;5(1):63–70.
40. McGrath SH, Snyder ME, Duenas GG, Pringle JL, Smith RB, McGivney MS. Physician perceptions of pharmacist-provided medication therapy management: qualitative analysis. J Am Pharm Assoc (2003). 2010;50(1):67–71.
41. Brown CA, Bailey JH, Lee J, Garrett PK, Rudman WJ. The pharmacist-physician relationship in the detection of ambulatory medication errors. Am J Med Sci. 2006;331(1):22–4.
42. Makowsky MJ, Schindel TJ, Rosenthal M, Campbell K, Tsuyuki RT, Madill HM. Collaboration between pharmacists, physicians and nurse practitioners: a qualitative investigation of working relationships in the inpatient medical setting. J Interprof Care. 2009;23(2):169–84.