



University of Sunderland: MSc in Clinical Pharmacy

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Statement of work undertaken

Over recent years, there has been a significant shift in the roles provided by a community pharmacist. Many services now exist in pharmacies to allow patients to seek medical advice and treatment as an alternative to their general practitioner (GP). This research project set out to evaluate a novel community pharmacy referral service, GP2Pharmacy, in South Tyneside. GP2Pharmacy involves the management of patients presenting with uncomplicated illness such as urinary tract infections (UTIs), tonsillitis, impetigo, otitis externa, shingles, cellulitis and dyspepsia in a community pharmacy setting. The study involved scrutinization and analysis of service activity data with the intention of formulating trends surrounding service outcomes based around demographical data. Statistical analyses were applied to service activity data to ensure results and identified relationships were significant. Throughout this study, data has supported the recent growth of community pharmacy and its role in managing a wider range of patients through effective clinical service delivery.

Statement surrounding funding and learning

I would like to thank PRUK for awarding this bursary to kickstart my career in research. Without it, I would have not been able to devote as much time to the research project and my associated development as a researcher.

I have learned a lot about conducting research over this past year including the basics of evaluative research in particular quantitative analysis. To assist my development in quantitative research, I had to gain an understanding of statistical analysis, which was supported by input from statisticians employed at the University of Sunderland. This learning will help ongoing research and applications to various projects I will be involved with going forward. The topic of this research was also relatively new to me at the beginning. Whilst I was previously aware of the rationale behind novel community pharmacy services, I was limited in my understanding surrounding specific service developments and the rising demands in general practice. Following this research, I feel I have developed a clear understanding for the necessity of increased and improved service provision within community pharmacy to continue upskilling the profession and impacting a wider patient population.

The learning I have achieved from this research, in combination from guidance received from my supervisors, has given me a solid foundation to begin my research career. I will look to continue my involvement in pharmacy research and build my own stature as a researcher.

Background

Demand on general practice has significantly increased in recent years resulting in a potentially unsustainable system for the management of both long-term and acute medical needs. Increased demand has coincided with a reduction in the English GP workforce. In 2016, there was an overall 3.5% reduction in the number of GPs working in the NHS (Abel et al, 2020).

A recent report discovered that approximately 27% of appointments with a GP were classified as potentially 'avoidable' as many of these appointments could have been appropriately managed in another healthcare setting (The King's Fund, 2020). Clinical practitioners have expressed major concerns surrounding high patient expectations and the demands relating to accessible same-day appointments, continuity of care, treatment and self-care advice (Clay and Stern, 2015). There is also evidence of a decline in the willingness of patients to self-manage low acuity conditions or minor ailments, with many preferring to initially seek advice from their general practitioner rather than alternative healthcare professionals for treatment or advice (Rennie et al, 2012).

To successfully address and manage the significant demand within general practice, other healthcare providers must be accessed through effective service provision. Many GPs are encouraging pharmacist involvement to grow through promotion of their unique skillset to achieve a more consistent and enhanced level of patient care across multiple sectors (Hall et al, 2018). Despite the availability of many enhanced services within community pharmacies, uptake onto these services is low. Existing literature documents that patients associate the role of a pharmacist within the dispensing and preparation of medication, demonstrating a lack of awareness of the pharmacist's role (Hindi et al, 2018). Despite this, evidence shows that patients and prescribers believe pharmacists to be well placed to provide enhanced clinical services due to availability and ease of access (Sturrock, 2019).

Pharmacists have significant expertise in the identification and management of commonly presented conditions, ranging from those able to be managed in a pharmacy to those which may need prescription-based management. Given that there is a continuing trend of increasing demand in general practice, community pharmacists can be utilised as a key target to relieve this pressure through utilising their key skill set. Community pharmacists have extensive knowledge in identifying and managing common ailments, be it those which may be managed in a community pharmacy or those which may be managed in general practice. Utilising these skills can contribute to reducing demand whilst further integrating community pharmacies with general practices.

Many services have been produced throughout the UK within community pharmacy aiming to enhance the involvement of community pharmacists in patient care through increasing the range of conditions pharmacists can manage in addition to reducing pressure on general practice.

GP2Pharmacy allows pharmacists to widen their scope of practice through the diagnosis and management of commonly encountered uncomplicated conditions that would ordinarily require management within the general practice setting. Within this service, patients are referred to community pharmacies when presenting with symptoms surrounding urinary tract infections (UTIs), impetigo, tonsillitis, otitis externa, shingles, heartburn and cellulitis. Following consultation with a pharmacist, a patient may be managed through one of the following outcomes: self-care advice, sale of a pharmacy medication, supply of a medication using the pharmacy minor ailments scheme (MAS), supply of a medication using service PGDs or escalation for additional medical interventions. Pharmacists were provided with an opportunity to attend face to face training sessions to learn about the PGDs and learn the clinical skills needed to provide the service. This was to ensure all pharmacists had the necessary clinical skills and examination techniques to carry out consultations.

GP2Pharmacy is not the first service aimed at upskilling pharmacists and managing uncomplicated acute conditions. Pharmacies in Scotland have been involved with services for a number of years targeting patients with UTIs (Hind et al, 2018). The rationale was to provide patients with an alternative source of medical advice and treatment without needing to see their GP. Pharmacists were selected due to their speciality in identifying and managing common conditions. Findings demonstrated the positive impact community pharmacies can have when managing uncomplicated conditions, which ordinarily would require interventions from general practice. Stewart et al (2018) also reported similar findings in a service aimed at managing patients with UTIs, impetigo and acute exacerbations of COPD. The report highlighted that patients praised these services due to the ease of access and pharmacist availability and clinical knowledge. Many patients were unaware that pharmacies could provide such services and would happily access them in the future should similar symptoms arise.

Aims and objectives

The overall aim of this study was to assess the delivery of the GP2Pharmacy service, primarily focussing on the investigation of how patient demographics affected service outcomes. The aims of this project will be achieved through the following objective:

- Conduct statistical analysis using SPSS V25 (IBM Corp, 2017) to assess how healthcare setting and patient specific variables such as age and gender influenced service delivery.

Methods

Study Design

Quantitative analysis formed the basis of the study. PharmOutcomes was utilised for consultation data collection. Data was then anonymised to reduce bias and sent to the researcher for analysis.

Setting

Consultations occurred in community pharmacies and analysis of consultation data occurred in an office setting.

Participants, Population and Study Period

There were 30 participating community pharmacies and 23 participating GP practices at the time of the study. Between December 2018 and June 2020, 1973 consultations were performed. All patients who were referred from their general practice to any participating community pharmacy were included in the service data set. There were no exclusion criteria to note as all patients referred to community pharmacies were assessed by a pharmacist and inputted into PharmOutcomes.

Quantitative variables and statistical analysis

Statistical analysis was conducted using SPSS V25 (IBM Corp, 2017). A hierarchical loglinear analysis was performed to assess the association between gender, presenting symptoms, consultation outcome and which PGD was supplied. Patient ages were also analysed through analysis of variance (ANOVA) to assess differences in service variables between age groups.

Ethical Approval

Ethical approval was obtained from the University of Sunderland Ethics Committee, reference number: 005622. All aspects of this study were carried out in accordance with GDPR.

Referral criteria of service to add in

Results

Results demonstrated that participation of pharmacies and GP practices impacted service delivery. Pharmacy 5 conducted the highest number of consultations, significantly more than any other pharmacy. In comparison, four pharmacies failed to register a single consultation throughout the pilot phase (Figure 1). Data surrounding patient referrals from individual practices also gave insight into service delivery. Practice 15 referred the highest number of patients, significantly higher than other participating practices. In comparison, there were six practices who registered fewer than ten referrals (Figure 2).

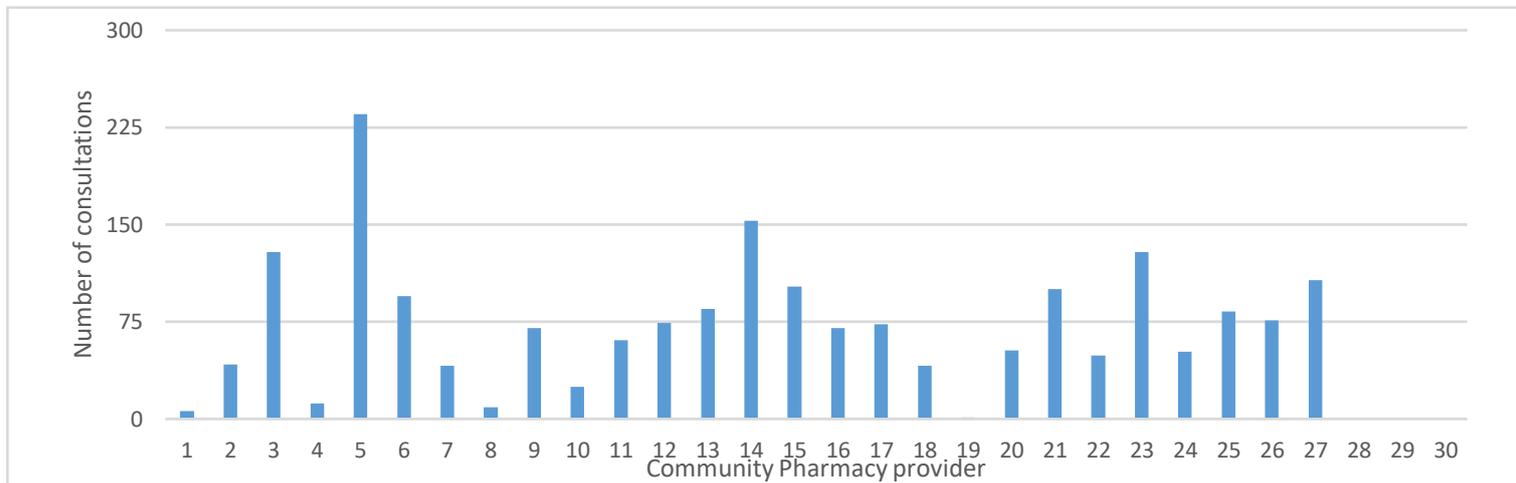


Figure 1: Number of consultations provided by each participating community pharmacy

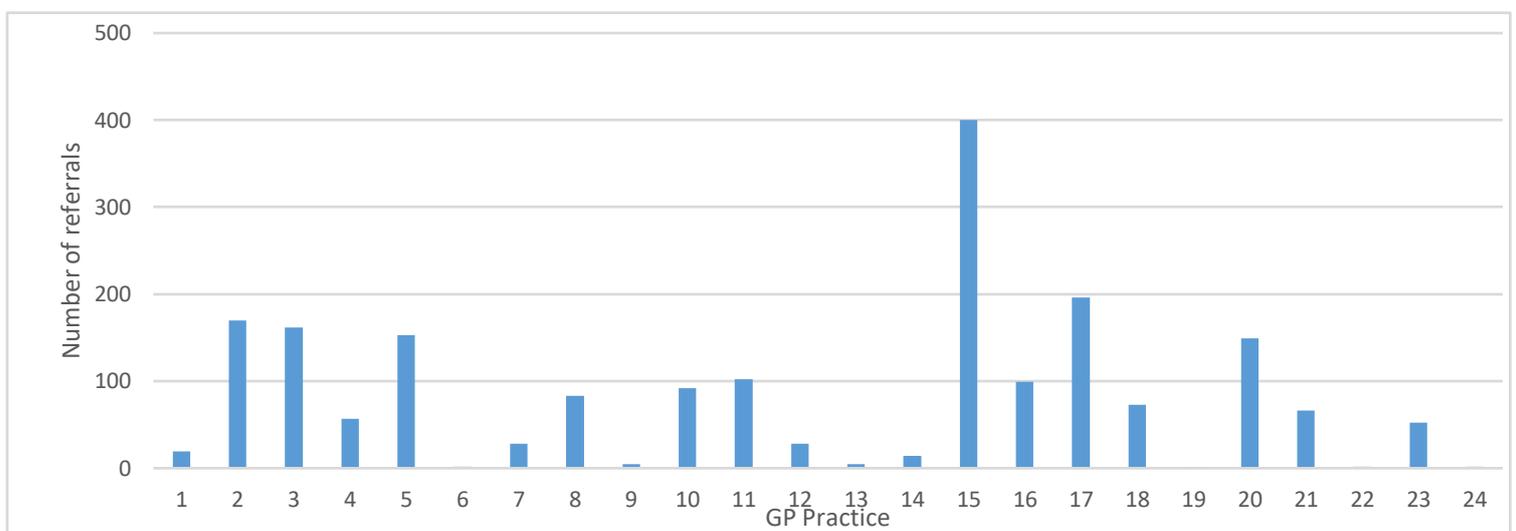


Figure 2: Number of referrals made by each participating practice

Analysis of patient age highlighted that patients aged 30-39 were the most frequently referred age group (Table 2) compared to patients over 70 accounting for the fewest referrals. Females were referred more regularly than men overall and the modal patient for the study was a female patient with a mean age of 33.7 (95% CI 31.3-36.2). UTIs were the most commonly presented symptom across the study (Table 1), primarily occurring in female adults between 20-39 years old (Table 2). Supply of medications using a PGD was the most common consultation outcome, followed by minor ailment schemes (Table 3). Escalation for additional advice was also common; the main method of escalation was to a GP. PGDs were supplied regularly throughout the study across all age groups. However, it was not the most common outcome for all age groups; patients aged 20-69 were most commonly managed using a PGD compared to patients under the age of 20 or over 70 managed more regularly using minor ailment schemes (Table 2). Nitrofurantoin was the most common PGD supplied to patients across the study, far more than any other PGD (Table 5). Results highlighted that four PGDs were accessed regularly: nitrofurantoin, fusidic acid, phenoxymethylpenicillin and Otomize.

Loglinear analysis was used to assess significance between gender and service variables.

Four- and three-way interactions between gender, presenting symptoms, consultation outcome and PGD supply were not significant ($\chi^2(1728) = 0.00, p = 1.0$; $\chi^2(3936) = 0.03, p = 1.0$). Two-way analysis did identify significance between gender and presenting symptom and between presenting symptom and PGD supplied ($\chi^2(192) = 965.79, p < .001$). All other two-way analyses were insignificant. There was a small but significant difference in age between men ($M=34.8, SD=24.5$) and women referred ($M= 37.3, SD = 20.2$), $t(903.04) = 2.18, p = .03, d = 0.12, 95\%CI [0.02, 0.21]$. Ages were also significantly different depending on presenting symptom ($F(1,1950) = 10.19, p < .001$) with post-hoc testing (Tukey's HSD) demonstrating patients with suspected impetigo were youngest ($M = 18.1, SD = 18.9$) and those with shingles were oldest ($M = 55.6, SD = 16.0$) while all other age groups overlapped between these extremes.

Presenting Symptom	N, % of referrals (females)	N, % of referrals (males)	Presenting symptom	N, % of referrals (females)	N, % of referrals (males)	Presenting symptom	N, % of referrals (females)	N, % of referrals (males)
Suspected UTI	401, 20.3	6, 0.3	Suspected Chest infection	1, 0.05	1, 0.05	Eye Symptoms	80, 4.1	62, 3.1
Rash (impetigo, non-impetigo)	58, 2.9 168, 8.5	36, 1.8 106, 5.4	Cough	59, 3	40, 2	Cold/flu	178, 9	59, 3
Allergies	18, 0.9	4, 0.2	Pain	36, 1.8	15, 0.8	Bleeding	0, 0	1, 0.05
Ear	166, 8.4	96, 4.9	Reflux	5, 0.3	0.15	Genital	17, 0.9	3, 0.15
Suspected Cellulitis	34, 1.7	22, 1.1	GI	26, 1.3	11, 0.6	EHC	3, 0.15	0, 0
Haemorrhoids	0, 0	2, 0.1	Suspected shingles	18, 0.9	11, 0.6	Suspected tonsillitis	142, 7.2	59, 3
Mouth ulcers	5, 0.3	2, 0.1	Oral thrush	8, 0.4	4, 0.2	Shortness of breath	1, 0.05	0, 0
Wound dressing	2, 0.1	0, 0	Not categorised	2, 0.1	2, 0.1			

Table 1: Breakdown of presenting symptoms as documented in PharmOutcomes

Age Group (years)	Total referrals (n, % of total referrals)	Most common presenting symptom (n, % of age group referrals)	Most common consultation outcome (n, % of age group referrals)	PGD medications supplied (n, % of age group referrals)	Most common PGD medication supplied (n, % of total PGD supplies)
0-9	254, 12.9	Rash (86, 33.9)	MAS medication supply (122, 48)	46, 18.1	Fusidic acid (43, 93.5)
10-19	234, 12.2	Tonsillitis (48, 20.5)	MAS medication supply (72, 30.8)	72, 30.8	Phenoxymethylpenicillin (31, 43)
20-29	310, 15.7	UTI (89, 28.7)	PGD medication supply (134, 43.2)	133, 43.2	Nitrofurantoin (64, 46.4)
30-39	353, 17.9	UTI (89, 25.2)	PGD medication supply (143, 40.5)	143, 40.5	Nitrofurantoin (62, 44)
40-49	221, 11.2	UTI (77, 34.8)	PGD medication supply (86, 38.9)	86, 38.9	Nitrofurantoin (56, 65.1)
50-59	260, 13.2	UTI (83, 31.9)	PGD medication (102, 39.2)	102, 39.2,	Nitrofurantoin (54, 52.9)
60-69	191, 9.7	UTI (44, 23)	PGD medication (54, 28.3)	54, 28.3	Nitrofurantoin (26, 48.1)
70+	150, 7.6	Ear (30, 20)	MAS medication supply (45, 30)	35, 23.3	Otomize (14, 40)

Table 2: Breakdown of consultation variables by age group

Consultation Outcome	Advice only	Sale of a pharmacy medicine	MAS provision	PGD medication supply	Escalation to GP	Escalation to A&E or out of hours	Other
Frequency (n, %)	329, 16.7	153, 7.8	471, 23.4	671, 34	292, 14.8	21, 1.1	36, 1.8

Table 3: Breakdown of consultation outcome

Gender	Total referrals (n, % of total referrals)	Most common presenting symptom (n, % of gender referrals)	Most common consultation outcome (n, % of gender referrals)	PGD medications supplied (n, % of gender referrals)	Most common PGD medication supplied (n, % of total PGD supplies)
Male	572 (29%)	Rash (142, 24.8)	MAS medication supply (176, 30.8)	133, 23.3	Otomize (38, 28.6)
Female	1401 (71%)	UTI (401, 28.6)	PGD medication supply (539, 38.5)	539, 38.5	Nitrofurantoin (274, 50.8)

Table 4: Breakdown of consultation variables by gender

PGD	Frequency of supply (n, % of total PGDs)
Aciclovir 800mg tabs for shingles	12, 1.8
Clarithromycin 250mg tabs for cellulitis	3, 0.4
Flucloxacillin 500mg caps for cellulitis	42, 6.3
Clarithromycin 250mg tabs for tonsillitis	16, 2.4
Phenoxymethylpenicillin 250mg tabs for tonsillitis	125, 18.6
Nitrofurantoin 100mg MR tabs for UTI	275, 41
Fusidic acid 2% cream for impetigo	91, 13.6
Otomize ear spray for otitis externa	105, 15.6
Omeprazole 10mg capsules for heartburn	2, 0.3

Table 5: Breakdown of PGD medication supply

Variables Compared	Statistical Test	Statistical Result
Patient age and presenting symptom	Analysis of variance (ANOVA)	F(22, 1952) = 11.105, p<0.001
Patient age and consultation outcome	Analysis of variance (ANOVA)	F(8, 1966) = 7.442, p<0.001
Patient age and PGD medication	Analysis of variance (ANOVA)	F(6, 663) = 1.68, p<0.001).
Gender and presenting symptom	Chi-squared analysis	χ^2 (24) = 222.6, p<0.001.
Gender and consultation outcome	Chi-squared analysis	χ^2 (8) = 55.4, p<0.001.
Gender and PGD medication supply	Chi-squared analysis	χ^2 (8) = 18.1, p<0.005

Table 6: Summary of statistical tests

Discussion

Raw statistical data demonstrated that community pharmacy and general practice participation in the service could independently affect volumes of patients enrolled. There were significant differences in patient volumes referred from specific general practices and significant differences in patient volumes assessed at specific community pharmacies. There is a potential causative link behind this, surrounding location and proximity of practices and pharmacies, which will require further research to assess. Collaboration between community pharmacies and general practice will be essential to increasing the numbers of patients enrolled on this service. The main overall concern surrounding patient volume was the lack of referrals made to community pharmacies overall. The pilot made 8000 appointments available and only 1973 were accessed. It is noted that a global health pandemic affected service delivery for three months, but this does not wholly account for lower than intended referral volumes. Further research will be required to assess the reasoning behind low referral volumes and address any factors which could be addressed to increase patient referrals.

Supplies of antibiotics through community pharmacy PGDs is an area of healthcare which has grown over a number of years. Results from this service indicate successful management of UTIs, specifically females aged 30-39 (Table 2 and 4). Of all patients referred for a suspected UTI, 67.6% were managed in the pharmacy setting using service PGDs (Table 5). Examination of the standardised residuals in the significant two-way interactions confirms the strong association of suspected UTI symptoms and nitrofurantoin supply when a female patient presents for consultation (male $z = -10.3$ v female $z = 6.6$). These results are associated with the high incidence of UTIs in females. It is estimated that 50-60% of middle-aged female adults present with at least one UTI throughout their lives (Medina and Castillo-Pino, 2019). In addition, it is estimated that 13.7% of community prescriptions for infections in the UK are to treat a UTI. This indicates a high prevalence

and therefore a key target for community pharmacies to enhance their involvement in the management of a UTI. Studies in Scotland by Stewart et al have also demonstrated that community pharmacies can provide an important role in managing patients with UTIs, mirroring findings from this service.

Results demonstrated that age could also affect service outcomes in addition to gender. Patients with suspected impetigo were youngest referred (M=18.1 SD=18.9) and those with shingles were oldest (M=55.6, SD = 16). Breyre and Frazee identified that within the UK, impetigo occurs primarily in children and results from this study support this existing knowledge. Results of this study also highlighted that of all patients presenting with suspected impetigo, 96.8% were successfully managed in the pharmacy setting using PGDs, demonstrating pharmacists are capable of diagnosing and appropriately managing impetigo. Stewart et al conducted similar research in Scotland, obtaining results which demonstrated the success of impetigo management in community pharmacies. Despite the success of GP2Pharmacy in managing impetigo, use of formulary choices may need to be revised going forward. NICE currently recommends the use of hydrogen peroxide as first line impetigo treatment, guidelines which GP2Pharmacy currently does not utilise (NICE, 2020). To enhance service delivery and treat patients with current evidence-based medicine, hydrogen peroxide should be considered for implementation in this PGD. Overall, age was not a good marker at distinguishing between age groups as most patients were in their 30s, but epidemiology and demographical data can be used to interpret study data and assess delivery of specific PGDs.

Across the study period, data demonstrates that tonsillitis was a commonly encountered and commonly managed symptom in community pharmacies. Mountzourani et al identified that community pharmacists are well placed to manage patients presenting with tonsillitis be this with or without the utilisation of antimicrobial therapy. This study identified that 70% of patients were managed with a PGD following presentation of suspected tonsillitis (Table 5), most commonly in patients aged 10-19 years (table 2), although there was no statistical significance associated with this. Tonsillitis is an easily identifiable condition in the community setting based upon clinical presentation and can be interpreted effectively using the FeverPAIN scoring system. GP2Pharmacy utilised this system as part of the consultation process which enabled pharmacists identify whether presenting symptoms required antimicrobial therapies or not.

Otitis externa was also managed successfully throughout the study period. Despite no statistical links between gender or patient age, raw data demonstrates high uptake of patients presenting with ear symptoms and also regular provision of the PGD for otitis externa. In comparison to other service PGDs, otitis externa was not managed as regularly; only 40.1% of patients presenting with ear symptoms were diagnosed with otitis externa. The lower proportion of PGD

supplies for otitis externa compared to other PGDs is associated with the possibility of a range of other potential ear complaints, including impacted wax. Nevertheless, results still demonstrated that a high proportion of patients were able to be successfully managed in a community pharmacy setting, corresponding to findings in similar services conducted throughout the UK. Hall et al identified that community pharmacists were able to effectively distinguish between otitis externa and alternative ear complaints. This study reinforces the evidence base, suggesting community pharmacists are well equipped to manage otitis externa.

It is noted throughout this service, all but two PGDs surround the supply of antimicrobial therapies. This poses an initial concern surrounding antimicrobial resistance. However, this service provided a unique opportunity for pharmacists to become involved in positively impacting the drive against antimicrobial resistance. Service outcomes surrounding PGD supply suggest that community pharmacists were successfully able to assess when and when not to supply an antimicrobial to a patient, therefore preserving the risks of antimicrobial resistance.

The UK has an ageing population and studies show that 58% of patients aged over 58 have at least one long term condition (LTC), putting them at increased risk of complications (Department of Health, 2012). As previously stated, age is shown to influence which groups of patients are referred to pharmacies for assessment; in particular elderly patients were referred least frequently. A suggested reason for this is the increased risk of complicated illness and higher proportion of co-morbidities in this age group.

Prior to service delivery, participating pharmacists were offered face to face training for each PGD including the use of clinical equipment and training surrounding specific diagnostic pathways and assessment scoring tools allowing them to undertake high quality consultations. Many of the PGDs included information surrounding national treatment pathways including UTI management in women under 65 years (NHS England, 2020) and how to use and interpret a FeverPAIN score. This training allowed pharmacists to appropriately assess patients and determine the most suitable method of treatment. It is this training that provides the necessary knowledge to continue upskilling pharmacists.

Results also identify secondary endpoints that relate to findings in the literature surrounding patient knowledge of pharmacy services. Many presenting symptoms were associated with minor illness including haemorrhoids, cold and flu, cough and rashes (Table 1). Patients can only be referred to participating pharmacies once they have been referred by their general practice. It is also noted from Table 3 that a vast proportion of referred patients were managed using minor ailment services. It is well known that patients do not routinely seek out the advice from their pharmacist for acute minor illness and there have been significant drives to improve this (Hind et al, 2018). Results

from this study strengthen the findings from the literature relating to patient awareness. It is essential that there is continued promotion of the appropriate reasons to seek out pharmacist advice to enable patients to be more appropriately informed of how to manage acute minor illness.

This study has identified that community pharmacies are an appropriate healthcare setting for patients to access for the management of uncomplicated illness that would ordinarily require management with a prescription from general practice. Despite the successful management of many symptoms using service PGDs, uptake posed a significant burden on how well the service could have performed. A low volume of referred patients over the study period (n=1973) indicates that it is likely that this service has not made a significant impact on the workload pressures in general practice.

Limitations

Despite results demonstrating effectiveness of the GP2Pharmacy service, known global health issues have affected the planned research methodology. A questionnaire was intended to go live in April, but this was then pushed back due to the temporary withdrawal of the service to reduce patient contact in pharmacies. A questionnaire will be rolled out for future research. Consultation data also required coding prior to analysis; symptoms were grouped based upon data entered by consulting pharmacists and therefore required a degree of interpretation. It is also noted that this study did not assess patient and stakeholder feedback and therefore links cannot be made surrounding positive outcomes and opinions of those involved in service delivery.

Impact

The results of this study demonstrate the development and growth within the pharmacy profession in recent years. Increased usage of clinical skills is fundamental to promote increased service provision within community pharmacy, improved public confidence in the profession and increased integration with other healthcare settings. In addition, findings can support stakeholders to identify additional patient groups and presenting symptoms to incorporate into the service, widening the service scope whilst promoting the widening skillset of the community pharmacist. Services similar to GP2Pharmacy are few and far between throughout the UK and results of this study could be used to demonstrate nationwide how pharmacies can contribute to the management of acute uncomplicated illness and relieve significant pressures on general practice.

Dissemination

Throughout the study, the GP2Pharmacy service team have kept in regular contact to determine research progress. They have provided additional data periodically throughout the study period for analysis. The service team will be provided with a copy of this report to ensure they can

continue to develop and progress the GP2Pharmacy service to improve care provided to patients in a community pharmacy setting. To highlight and advertise the service and this research, the University of Sunderland featured this research on its online platforms. This project was also presented online at the annual HSRPP conference midway through the research period. I will aim to present full findings of this study at a national conference once details of such conferences are released.

This study was an initial evaluation surrounding service outcomes. Additional research is necessary to continue learning about GP2Pharmacy and similar services; next steps will be aimed at patient feedback and stakeholder involvement. I will also look to achieve my first publication with this study following critique from supervisors and peer-review processes.

Conclusion

This study has been able to demonstrate that community pharmacists are able to manage a wider scope of acute medical conditions that would ordinarily be managed within general practice. In particular, management of UTIs, impetigo, tonsillitis and otitis externa were shown to be successful. However, the sample size of this study was lower than expected so results cannot be used to indicate if there was any significant reduction in workload within general practice. Findings also reinforced the fact that patients often seek advice from general practice rather than their community pharmacist. Many patients were referred to community pharmacies from general practice which resulted in management using either self-care advice or supply of a pharmacy medication, indicating a lack of awareness surrounding when to seek pharmacist advice. Despite clear success, continued development is essential to ensure more patients receive the additional support required surrounding uncomplicated conditions. As pharmacies become more involved with patient care, patient awareness should increase and result in increased uptake of clinical services and advice within the community pharmacy setting.

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