ROBERT GORDON
UNIVERSITY ABERDEEN

OpenAIR@RGU

The Open Access Institutional Repository
at Robert Gordon University

http://openair.rgu.ac.uk

This is an author produced version of a paper published in

Research in Social and Administrative Pharmacy (ISSN 1551-7411, eISSN 1934-8150)

This version may not include final proof corrections and does not include published layout or pagination.

Citation Details

Citation for the version of the work held in 'OpenAIR@RGU':

IRWIN, A. and WEIDMANN, A., 2015. A mixed methods investigation into the use of non-technical skills by community and hospital pharmacists. Available from *OpenAIR@RGU*. [online]. Available from: http://openair.rgu.ac.uk

Citation for the publisher's version:

IRWIN, A. and WEIDMANN, A., 2015. A mixed methods investigation into the use of non-technical skills by community and hospital pharmacists. Research in Social and Administrative Pharmacy, 11 (5), PP. 675-685.

A mixed methods investigation into the use of non-technical skills by community and hospital pharmacists.

A.Irwin[1] A.E. Weidman[2] M. Watson[3]

[1] Industrial Psychology Research Centre, School of Psychology, University of Aberdeen,

Scotland, AB24 2UB.

[2] School of Pharmacy and Life Sciences, Robert Gordon University, Aberdeen

[3] Centre of Academic Primary Care, University of Aberdeen, Scotland.

Address for correspondence:

Dr Amy Irwin, School of Psychology, University of Aberdeen, William Guild Building,

Aberdeen, AB24 2UB, Scotland, UK.

Tel: (01224) 273003; Fax: (01224) 273211; Electronic mail: a.irwin@abdn.ac.uk

Abstract

Background: Non-technical skills refer to the social and cognitive factors that may influence efficient and safe job performance. Research has shown that non-technical skills are an important element of patient safety in a variety of healthcare disciplines, including surgery, anaesthesia and nursing. However, the use of non-technical skills in pharmacy practice has not yet been fully assessed.

Objective: To examine attitudes toward, and use of, non-technical skills by pharmacy personnel.

Methods: A mixed methods approach was used: Step 1 was an attitude survey designed to explore pharmacy personnel attitudes towards non-technical skills and inter-professional collaboration, with a sample of 62 community and hospital pharmacy staff. Step 2 was a qualitative interview study conducted using the critical incident technique, with a sample of 11 community pharmacists.

Results: A discrepancy was found in the opinions of community and hospital pharmacists on three non-technical skill constructs: team structure, mutual support and situation monitoring, with community pharmacists more positive about all three. Both groups reported low levels of collaboration with primary care physicians. Furthermore, five non-technical skills were identified as key elements of successful pharmacist performance from the interview transcripts: Situational awareness; decision-making; leadership; teamwork; task management.

Conclusion: The survey and interviews identified the specific non-technical skills that are unique to pharmacists. This represents the first step towards the development of a behavioural rating system for training purposes that could potentially improve the non-technical skills of pharmacists and enhance patient safety.

1. Introduction

Medication error is 'a failure in the treatment process that leads to, or has the potential to lead to, harm to the patient'.[1] Patient harm related to drug error is associated with substantial financial costs due to: prolonged treatment, hospital readmission and legal claims.[2] Medication error severity can vary; a recent National Health Service (NHS) report in the UK showed that 83% of error reports detailed no harm to the patient, 4% reported moderate harm and 0.1% reported severe harm or death.[3] Of the reported medication incidents 18% were due to dispensing error.[3] Dispensing errors in primary and secondary care can be caused by a number of factors at both the individual (stress, lack of training[4] overwork, fatigue, interruptions[6]) and organizational level (busy wards / pharmacies, staffing levels[4, 5] proximity of similar drug names[5, 7]).

Research with community pharmacists has explored the sociotechnical factors that are encountered in practice, and their potential impact on medication safety.[8] Sociotechnical factors encompass the individual, the task, technical aspects, the environment and organizational factors.[9] Applied to community pharmacy these factors would encompass the pharmacist, the design of the pharmacy, automated dispensing technology, interactions with patients, the pharmacy team and the dispensing task.[10] The reported findings indicate that medication safety can be influenced by social factors, such as the pharmacist's relationship with the prescriber, or interactions with patients, together with organizational factors such as management and governance issues.[8]

The potential impact of social factors on pharmacy practice has also been explored through research examining elements of teamwork.[11] The presence of non-pharmacist staff (e.g. pharmacy technicians, medicine counter assistants) and the need for collaboration with

other members of a multi-disciplinary healthcare team has highlighted the importance of teamwork for ensuring the safe and efficient dispensing of medication.[11] Thus, effective teamwork, both internal (within the pharmacy[11]) and externally (interdisciplinary collaborative teams[12]) is an important part of the pharmacist's role in healthcare. Specifically, research has shown that effective pharmacist and physician collaboration can positively influence hypertension management[13, 14] and diabetes.[15]

The social and cognitive skills necessary for effective and safe work performance have been extensively researched within healthcare under the heading of 'non-technical skills' (NTS). These are distinct from sociotechnical factors in that NTS refer specifically to the cognitive (decision-making, situation awareness)[16] and social (teamwork, communication, leadership)[17] factors that are integral to job performance, but which are separate from the technical or practical skills required to complete a task. A strong link has been shown between NTS and adverse events, for example, adverse incidents in surgery have been linked to failures in communication and teamwork[18]. As a result, research has evaluated the non-technical skills of surgeons[18], anaesthetists[16] and scrub nurses[19], in each case producing a non-technical skills taxonomy for training purposes. Importantly, the use of NTS training programmes has been highlighted as a method for improving patient safety and minimising adverse events.[19, 20, 21] A recent study examining the management of aggressive methadone patients by community pharmacists reported the use of NTS by community pharmacists.[22] The results indicated that pharmacists utilise skills such as teamwork and task management when dealing with aggressive patients.[22] However, further research is required to determine the extent to which these skills are used in everyday practice.

The aim of the current paper was to examine the utilisation of NTS by pharmacy personnel. A mixed methods approach comprised of survey and interview techniques was used to enable data triangulation.

> **Comment [IAL1]:** Cognitive factors not covered by sociotechnical skills – is this clear enough or should I state that cognitive skills not covered under sociotech skills (seems a bit repetitive)

Prior research into the behaviour of healthcare staff indicates that the attitudes of staff toward a particular issue or behaviour (such as teamwork) can function as a determinant of that behaviour (i.e. a positive attitude toward a particular behaviour can increase the likelihood of that behaviour being implemented).[23] Attitude measurement is therefore a commonly used tool to investigate staff behaviours. Previous findings indicate that the attitudes of healthcare staff toward teamwork, both within their department and inter-professional teamwork, tend to vary according to job role[23], training, prior experience and education.[24] The attitude survey aimed to examine, and compare, attitudes toward NTS and inter-professional team working across community and hospital pharmacy staff.

A qualitative interview study was then conducted, based on the critical incident technique.[25, 26] The aim of this study was to examine the use of NTS by community pharmacists on an everyday basis. Use of the critical incident technique allowed the researchers to collect a great amount of detail about the thoughts and actions of pharmacists during their interactions with clients. The detail was examined using thematic analysis in order to identify the non-technical skills used and compare the reported skills with those reported in other areas of healthcare such as surgery.[18]

This work was approved by the School of Psychology Ethics Board, University of Aberdeen.

2. Pharmacy personnel attitudes toward non-technical skills (survey).

2.1 Method

2.1.1 Participants
Pharmacy staff ($n = 62$) were recruited from four Scottish Health Boards, randomly selected from the 14 Health Boards that exist in Scotland. The sample was comprised of both community ($n = 26$) and hospital ($n = 36$) pharmacy staff. The majority of the respondents

were pharmacists ($n = 45$) registered with the general Pharmacy Council (GPhC) in the UK,

the remainder were trainee pharmacy technicians ($n = 9$), dispensers ($n = 2$), pharmacy

technicians ($n = 2$), a medicines counter assistant ($n = 1$) and a trainee dispenser ($n = 1$).

Recruitment was conducted using an e-mail or hard-copy recruitment letter sent to all of the

pharmacies that could be identified within the Health Boards, resulting in 300 pharmacies

(200 community pharmacies and 100 hospital pharmacies) across Scotland being contacted.

2.1.2 Procedure

Over a period of four months questionnaires were distributed to pharmacy personnel within

both community and hospital pharmacies via e-mail. In each case the Head of Pharmacy

Services in a specific area, or the lead pharmacist within a Scottish Health Board was

approached first; they then distributed the link to the online questionnaire among their staff

members.

The questionnaires were anonymous; participants completed an electronic consent

sheet, and then the questionnaire online, with data collection occurring via SNAP, an online

questionnaire management programme. Demographic data such as age and gender were not

requested in order to ensure anonymity and encourage participation in the study.

2.1.3 Questionnaire

The questionnaire contained three previously validated scales. Each scale structure was

identical to the original, but the wording was altered slightly to refer to pharmacists rather

than general 'employees' or 'managers'.

The first scale was based on the TeamSTEPPS teamwork perceptions questionnaire

(T-TPQ[27]) and featured five self-report scales designed to assess individual perception of

group-based behaviours. Each question was answered using a five-point likert scale, ranging

from 'strongly agree' to 'strongly disagree'. The five behaviours link closely to NTS and

include: situation monitoring, team structure, leadership, mutual support and communication.

The T-TPQ was followed by a 14-item scale[23] 'Quality of care / process', designed to assess attitudes toward inter-professional teamwork and collaboration. The inter-professional items were again answered using a five-point likert scale, ranging from 'strongly agree' to 'strongly disagree'.

The final section of the questionnaire was an adaptation of the Safety Attitudes Questionnaire (SAQ[28]) which has been used frequently in healthcare research.[28] The section of the scale adapted for the current study required participants to rank their communication and collaboration with team members both within and outside the pharmacy (for example: nurses, physicians, dispensers and patients). The participants indicated the level of collaboration with each group using a five-point likert scale which ranged from 'very high' to 'very low'.

2.2 Results

A total of 62 questionnaires were returned, providing a 21% response rate: 26 were received from community pharmacies (21 registered pharmacists, 5 members of pharmacy staff), 36 were received from hospital pharmacies (24 registered pharmacists, 12 members of pharmacy staff).

Analysis of the questionnaire results was conducted in three sections; T-TPQ, inter-professional teamwork and SAQ.

2.2.1 TeamSTEPPS Teamwork Perception Questionnaire

A total score was calculated for each of the five T-TPQ constructs (situation monitoring, team structure, leadership, mutual support and communication), the score could range from a minimum of 5, to a maximum of 35 (7 items per construct) as illustrated by Table 1 (the lower the score the stronger the level of agreement). Community pharmacists reported strong agreement to statements relating to team structure, communication and

support. Hospital pharmacy staff reported strong agreement with statements related to communication.

Table 1: Mean T-TPQ construct score (with standard deviation) by participant group (community and hospital pharmacy staff).

Construct	Community ($n = 26$)	Hospital ($n = 36$)
Team structure	13.9 (3.4)	18.7 (5.4)
Leadership	22.0 (11.6)	23.1 (8.5)
Situation monitoring	15.9 (5.5)	19.5 (5.1)
Mutual support	14.9 (3.2)	18.1 (4.6)
Communication	13.7 (4.3)	15.2 (4.2)

The total mean score for each construct was then analysed using a mixed factorial ANOVA; team behaviour represents the within subjects factor (with five levels denoted by the five constructs) with pharmacy type (community or hospital) as the between subjects factor. The mean scores for each construct differed significantly ($F(4, 216) = 20.53; p < 0.01$). The mean scores for each pharmacy type (community / hospital) also differed significantly ($F(1, 54) = 6.52; p < 0.05$), there was no significant interaction ($p > 0.05$).

Multiple post-hoc comparisons for each construct by group were conducted using between subjects t-tests; the results indicate that the total scores for the two pharmacy types differed for team structure ($t(59) = -3.69, p < 0.01$), situation monitoring ($t(56) = -2.74, p < 0.01$) and mutual support ($t(58) = -2.78, p < 0.01$), there was no significant difference for communication or leadership.

2.2.2 Inter-professional teamwork

A total mean score for each participant group was calculated by summing the scores for all 14 items (range: 14 – 70); community pharmacy staff ($m = 30.6$, sd = 6.7), hospital pharmacy staff ($m = 33.6$, sd = 11.2). The total mean scores were compared using a between subjects t-test, with no significant difference found ($p > 0.05$).

Comment [IAL2]: I am using the standard psychology format for reporting analysis within the results section – the last paper I published with RSAP used this format and was passed by the reviewers, so I will leave it as it is for now.

2.2.3 Safety Attitudes Questionnaire - collaboration with other staff members

The 12 SAQ items were scored individually for pharmacists only (pharmacy staff were excluded from this analysis to ensure conformity in the participant groups), with a mean collaboration score calculated for each participant group with each of the collaboration options (Table 2).
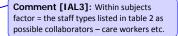
Table 2: Mean collaboration score with other healthcare staff members by participant group (community and hospital pharmacists).

Healthcare staff	Community Pharmacists ($n = 21$) (sd)	Hospital pharmacists ($n = 24$) (sd)
Physicians (primary care)	3.7 (1.1)	3.4 (1.5)
Physicians (secondary care)	3.5 (1.8)	4.2 (1.1)
Nurses	3.9 (1.1)	4.2 (0.9)
Care workers	3.5 (1.3)	4.1 (1.4)
Nursing home staff	4.0 (1.5)	3.9 (1.7)
Pharmacists	4.3 (0.7)	4.3 (0.9)
Pharmacy technicians	4.2 (1.1)	4.3 (1.0)
Medicine counter assistants	4.2 (1.2)	4.2 (1.4)
Pharmacy assistants	4.4 (1.2)	4.3 (1.3)
Dispensers	4.6 (1.1)	4.3 (1.4)
Pharmacy management	4.0 (1.3)	3.4 (1.4)
Patients / clients	3.9 (0.8)	4.1 (0.9)

The mean item score for each construct was then analysed using a mixed factorial ANOVA; healthcare staff type represents the within subjects factor (with 12 levels denoted by staff type) with pharmacy type (community or hospital) as the between subject factor. The

Comment [IAL3]: Within subjects factor = the staff types listed in table 2 as possible collaborators – care workers etc.

results indicate that the mean scores for each healthcare staff type differed significantly $(F(11,649) = 4.23; p < 0.01)$, indicating that pharmacists reported differing levels of collaboration with each healthcare staff group. There was no significant difference between pharmacy type, nor was there a significant interaction.

Multiple post-hoc comparisons for each healthcare staff type (results from both participant groups combined) were conducted using the Bonferroni correction for multiple pairwise comparisons, the results indicate that the mean item scores for physicians (primary care) differ significantly from the scores for dispensers ($p < 0.05$), the mean item scores for medicine counter assistants differ from the scores for pharmacy management ($p < 0.05$) and finally, the mean scores for dispensers also differ from pharmacy management ($p < 0.05$).

Comment [IAL4]: Do you mean add another column into the table with bonferroni p-values?

3. Non-technical skills in community pharmacy (interviews).

3.1 Method

3.1.1 Participants

A total of 11 practising community pharmacists (9 female, 2 male) from within one Scottish Health Board were recruited via a hard-copy letter sent via Royal Mail. The letter was sent to all of the pharmacies that could be identified within that Health Board. All recruited participants had a minimum of three years experience in community pharmacy and were registered with the General Pharmacy Council (GPhC) in the UK. The majority were working in independent pharmacies (9), with the remainder working within a chain pharmacy (2). The majority of the pharmacies (9) were in a rural location, the remaining two pharmacies were in an urban location.

Comment [IAL5]: This was a convenience sample based on geographical proximity to the university – not sure if we can say this as it would render the anonymity of the health board moot.

3.1.2 Data collection

Digitally audio-taped interviews lasting approximately 30 minutes were conducted over a 7 month period by one researcher (AI). The interviews were all conducted at the participants' place of work, within a quiet room on the premises.

The critical incident technique[25, 26] formed the basis of each interview, with participants asked to recount one challenging incident, where the participant had to deal with a problematic issue; the scenario could involve a patient or the pharmacy team, or both. The interviewees were asked to describe the incident in as much detail as possible, from just prior to the incident beginning, to immediately after the incident had finished. They were given the opportunity to discuss their thoughts and feelings surrounding the incident, together with their actions and the actions of other individuals in the vicinity. In the second part of the interview participants were asked questions related to non-technical skills, adapted from previous research in other areas of healthcare[19] (see Appendix 1).

Data saturation was determined by first specifying an initial sample size of nine participants, based on the relevant literature[29, 30]. The stopping criterion for data collection (where no new ideas are emerging) was two[29]. After the initial sample was gathered, two further interviews were conducted, with no new themes occurring within that sample, thus data saturation was determined to have been reached.

3.1.3 Data analysis

The interviews were coded independently using thematic analysis[31] by two of the authors. All coding and analysis was conducted using the qualitative data analysis programme Nvivo 10. The first three interview transcripts were repeatedly read and initially coded according to

the reported non-technical skills of pharmacists, pharmacy staff and patients, based on the non-technical skill categories identified in previous research.[19]

Once data collection had ceased, the transcripts were re-read, searching the narratives for descriptions of non-technical skills. These points were coded on the basis of previous literature, as follows: the behaviours reported by pharmacists were categorised under the headings described in previous literature[17] and used frequently throughout research on non-technical skills.[18, 19] The original categories were as follows: cognitive (decision-making, situational awareness) and social (teamwork, communication, leadership) together with task management skills and the management of stress and fatigue. Within each identified category a series of sub-categories describing specific behaviours were created; each of these was generated on an iterative basis in order to be specific to pharmacists as opposed to other healthcare staff. The second researcher (AW) then individually read and re-coded three of the transcripts according to these behaviours and categories in order to determine the reliability of the coding system.

Inter-rater reliability was calculated for each of the five identified non-technical skill categories using kappa coefficient for each area of coded text (situational awareness: $k = 0.81$, decision-making: $k = 0.75$, leadership: $k = 0.78$, teamwork: $k = 0.76$, task management: $k = 0.86$).

Comment [IAL6]: This is the standard method for assessing inter-rater reliability within qualitative data

3.2 Results

Each participant reported a single negative incident in detail, with 11 incidents recorded overall. The incidents reported included; refusal to dispense medication (3); dealing with upset patients (3); dealing with aggressive patients (3); dispensing error (1) and sudden patient illness (1). The incidents and the answers to the scripted questions were analysed for

reported non-technical skills. Table 3 presents a summary of the categories of non-technical

skills that were identified from the interviews.

Table 3: Thematic analysis of reported pharmacist behaviour, organised into five distinct non-technical skills categories.

Non-technical skill category	Coded skill	Number of pharmacists reporting skill	Example
Situational Awareness	Perception of surroundings	8	*'listening to the counter, answering the phone and being aware of what's going on'*
	Awareness of / monitoring staff actions	9	*'you've always got to have an ear open to see what's being sold, so if necessary you can intervene'*
	Recognition / awareness of patient behaviour	9	*'you might be aware that the customer coming in is difficult to handle'*
	Anticipation	7	*'you think a situation is not looking too good so you go out to deal with it'*
Decision-making	Dispensing decision	9	*'when you are making prescriptions you've got to decide the medicine is safe for the patient'*
	Identifying options	6	*'do you think it will be safe to go ahead with that [prescription], or do you think you should phone the doctor, or speak to the patient'*
	Selecting options	10	*'you're deciding in a split second, does this patient need counselling, or is it something I can deal with myself'*
	Risk management	4	*'if the patient comes in with those symptoms then you don't phone the doctor, you phone 999 straight away'*
Leadership	Directing or guiding task behaviours	8	*'you plan tasks, delegate tasks to certain people and then plan when they need to be done by'*
	Monitoring staff	7	*'there are certain people that I need to supervise more closely'*

	Supporting staff	9	'if somebody is struggling with something then I'll often go and help them, or I'll do something that needed to be done'
	Staff training	8	'I had to go and do some training with the member of staff to try and make sure things like that don't happen again'
Teamwork	Co-ordination	10	'usually everyone has their own role and knows how the shop works'
	Sharing information (communication)	11	'I say it to everyone to make sure everyone knows what we are doing'
Task management	Maintaining standards / following protocol	10	'when I come into the dispensary I see it as my job to make sure everything is correct and done as it should be'
	Organisation of resources	10	'make sure the pharmacy medicines are well stocked...organise the staff rota'
	Preparation	8	'I know that Monday is our busiest day so I will prepare for that by ordering in stock beforehand'
	Time management	4	'we will work to make sure our prescription load is cleared at the weekend'

The findings from the interview data will now be described in more detail, with quotes used to further illustrate the main findings.

3.2.1 Situational Awareness

The majority of the pharmacists interviewed felt that it was very important to be aware of what was going on within the pharmacy generally and were specifically attuned to the actions of their staff during the dispensing process. Many pharmacists listened for particular key words which would prompt action when heard:

'There are certain keywords that will flag up my attention like blood, pregnancy, pain and so on. If I hear any of those I tend to step in pretty quickly'. P8

Pharmacists also discussed an awareness of particular patient behaviours which would capture their attention, either because the patient may have a particular condition that the pharmacist might be concerned about, or because the patient is acting in a potentially aggressive way:

'Visual cues, so you see someone waddling in heavily pregnant or someone very elderly, then you might be a bit more alert as to what they are looking for'. P9

Finally, several of the participants used their awareness of their surroundings and previously observed patterns of behaviour, to anticipate certain situations, these included patient behaviours (aggression, upset), prescribing habits of doctors (expected prescription types, reactions to prescription requests) and potential dispensing problems (queues, lack of requested medication).

3.2.2 Decision-making

The majority of the participants felt that their most important decisions related to the dispensing process. These decisions were based on a clinical assessment of the drug type, suitability of the drug for the patient, checking for potential dispensing errors and potential safety issues.

In comparison, when pharmacists talked about identifying decision options, these options usually related to the patient, and potential courses of action:

'Do I give them an alternative, or refer them elsewhere, to the doctor or the hospital?'. P3

Similarly, when selecting options the decision was usually related to a particular course of action for a patient, such as additional counselling, referral to a doctor or a colleague. When making decisions, only a minority of pharmacists mentioned the

management of risk; in each case this was in response to a perceived emergency, or reported illness symptoms:

'The decision was made that the patient required my full attention'. P1

3.2.3 Leadership

All of the pharmacists who were interviewed agreed that the responsible pharmacist was the leader within the dispensary. As a result, all of the participants discussed particular actions they associated with leadership. The majority felt that one of their main roles was to support their staff members; this might be through support when dealing with difficult patients, providing positive feedback or helping to complete a task or answering questions:

'I encourage everyone to come and speak to me if there are any problems'. P11

In addition to supporting staff, the majority of the participants felt that a large part of their job role was to ensure that the pharmacy staff members were all provided with specific tasks, through delegation or organisation. They then monitored the staff to ensure the relevant tasks were completed:

'Anything that is behind the counter in the pharmacy has to be done under the supervision of a pharmacist'. P1

Finally, many of the pharmacists reported that they provided on the job training when required. Often this was given in response to an error or mistake made by the particular staff member.

3.2.4 Teamwork

All interviewees considered teamwork to be integral to running a pharmacy efficiently. However, given that pharmacists have a leadership role, only two teamwork behaviours were

identified: co-ordination and sharing information. In terms of co-ordination, there was a widely shared observation that each member of a pharmacy team has a distinct role to fulfil, which allows everyone to work together as a unit:

'Usually everyone has their own role, and knows how the shop works'. P7

Sharing information was reported to occur during regular team meetings, or during incidents as different actions were carried out. The main focus reported by each participant was to ensure that all staff members are aware of what is going on at any given time.

3.2.5 Task management

The interviewees' perceived a responsibility for all clinical and safety aspects of the dispensing process. As such, most of the pharmacists reported that they engaged in clinical checking (ensuring dose, administration and so on are appropriate), they complete relevant documentation, check any equipment is working properly and ensure that medicine guidelines are adhered to by patients and staff:

'For the morning after pill we have a sheet of things we have to stick to, such as questions related to the age of the patient'. P11

Many of the participants also reported that they had an organisational responsibility within the pharmacy. This included the organisation of staff rotas and annual leave, prioritisation of dispensing tasks and management of the medical stock. Related to this, the majority of pharmacists reported engagement in task preparation. This usually took place prior to medicine orders being delivered, or in the expectation of particular patients coming in to pick up their medication:

'The process is in place to ensure the medication is ready and waiting for them when they come in'. P8

17

Finally, in order to maintain the efficiency of the pharmacy, several participants reported specific time management behaviours, such as ensuring certain tasks were completed within a defined time limit, and setting the work pace to deal with a queue of patients.

4. Discussion

Previous research has shown the importance of non-technical skills in a variety of healthcare domains, including surgery[17], anaesthesia[16] and nursing.[18] The results of the current studies indicate that those skills are also important within pharmacy practice. The results of the attitude survey indicate that, first, the community pharmacy staff reported a significantly ($p <$ 0.01) more positive attitude toward team structure, situation monitoring and mutual support than the hospital pharmacy staff. This indicates that NTS may be used, or recognised, within community pharmacy more frequently than within hospital pharmacy. Second, no significant difference ($p > 0.05$) was found between the two pharmacy types in terms of inter-professional collaboration, with both groups reporting a relatively neutral response to those items. Finally, there was no significant difference between the two pharmacy types in terms of reported collaboration with other healthcare staff ($p > 0.05$). However, across both groups it appears that collaboration was more successful with medicine counter assistants and dispensers (in-group members) than with pharmacy management and physicians (out-group members).

Analysis of the interview transcripts indicated that community pharmacists utilise non-technical skills on a daily basis when running a pharmacy. These skills appear to be inherent in a number of tasks including the dispensing process, communication with staff and patients and the organisation of stock. The categories of non-technical skills identified within the

transcripts were: Cognitive (situational awareness, decision-making), Social (leadership, teamwork) and Task Management.

4.1 Attitudes toward teamwork and leadership

The results of the survey showed a discrepancy in community and hospital pharmacy staff perceptions of team structure, situation monitoring and mutual support, with community personnel reporting stronger levels of agreement across all three constructs. This mirrors previous findings which indicate that the attitudes of healthcare staff can vary according to job role and prior experience[23, 24, 32] and suggests that the training requirements of hospital and community personnel may differ.

Perhaps the most important discrepancy related to the construct of team structure, or the negative view of teamwork by hospital pharmacy personnel: Previous studies within healthcare have indicated that teamwork is an important factor in ensuring a high quality of patient care and positive clinical outcomes in areas such as nursing[33], and inter-professional working.[34] There has also been a reported negative correlation between teamwork and dispensing errors.[35] Research has also shown that teamwork was considered an enjoyable aspect of work by hospital pharmacists, and an aspect that was correlated with their job satisfaction[36], thus a poor level of teamwork may result in poor job satisfaction and a reduction in patient care. This result indicates that teamwork may need to be a focus in the development of future training programmes for hospital pharmacy staff.

A second notable finding is the negative attitude of both community and hospital pharmacy staff within the current sample toward the leadership construct. Leadership has been previously identified within the healthcare literature as an important variable in ensuring patient safety in healthcare areas such as critical care[37] and surgery.[18] Leadership was also identified as an important skill within the interview study for ensuring safe and effective

functioning within community pharmacies. The poor level of agreement with statements within the leadership construct in the survey is therefore surprising, and indicates that this may be an issue within some Scottish pharmacies. Further research is required to identify the specific nature of the issue.

4.2 Inter-professional collaboration with physicians

The results of the current study indicate that both hospital and community pharmacists rated their collaboration with healthcare staff external to the pharmacy as low in comparison to other pharmacy staff (in-group). Specifically, both groups reported low levels of collaboration with primary and secondary care physicians. This is a potential area of concern due to the positive effect pharmacist – physician collaboration has been shown to have on various illnesses, and should be addressed through further research in this area.[13, 15] Previous research indicates that a variety of factors can influence the pharmacist – GP relationship, including interactional elements (mutual respect), practitioner elements (trust) and environmental elements (location)[38]. A general lack of collaboration and communication[39] could also explain a negative perception of working collaboratively with GP's.

4.2 Non-technical skills (NTS) in community pharmacy

The results of the current study expand upon previous research findings[22] to indicate that community pharmacists utilise NTS on a daily basis, as opposed to primarily in response to aggressive patients. The main aim for pharmacists when using these skills was to ensure the safe and effective performance of the pharmacy as a whole.

Endsley[40] suggests that situational awareness, defined as three levels of cognition; perception, understanding and anticipation, is applicable in a variety of environments. Within the healthcare environment poor situation awareness has been linked to diagnostic

error[41], and situation awareness has been highlighted as a vital skill within various disciplines, including surgery and anaesthesia.[18] Within the current study pharmacists used situation awareness to monitor the dispensing environment, identify potential areas of concern and to anticipate events. This was necessary in order to ensure the correct and safe dispensing of medications within the pharmacy. Most of the pharmacists felt that this ability to monitor their environment developed over time, improving with experience. Similar skill development over time has been reported in other studies of non-technical skills.[19]

All of the pharmacists identified situations in which they would have to make decisions, with the majority based on dispensing medication or patient interaction. As such the decisions made mainly focused on the clinical element of the work; ensuring the safe dispensing of medication to patients. In each patient interaction a high level of communication was reported, often taking the form of describing the potential options to the patient. This is one of the recommended steps in shared decision-making[42], which is a recommended process within UK healthcare.

The participants perception of their leadership role shared many elements with the skill of leadership within other disciplines such as surgery[18]; particularly the skills of supporting staff and directing task behaviours. These skills were considered vital by pharmacists in order to perform their role as the responsible pharmacist, by which they have a designated responsibility for everything that happens within the pharmacy dispensary. Strongly linked to this leadership role were the task management skills. It could therefore be argued that task management and leadership could be combined. Further research with subject matter experts is required before such a step could be taken.

Although all of the participants identified teamwork as an important factor, due to their leadership role they did not talk about teamwork from the perspective of a general

member of staff. This reduced the possible behaviours that could be coded within the category of teamwork. It is possible that other members of staff within the pharmacy (e.g. dispensers and medicine counter assistants) would report additional team behaviours to those identified here. Thus future research could focus on the NTS of pharmacy staff as opposed to pharmacists in order to produce a wider view of behaviours within pharmacy practice.

Previous research within other healthcare disciplines has sought to provide a common terminology to develop training tools and allow discussion of NTS between colleagues.[19] The interview data reported here is a first step toward the development of that terminology within Pharmacy practice. Further research within the pharmacy environment, and the development of similar tools to those used in other areas (e.g. ANTS[16]) could allow pharmacists to utilise human factors techniques as part of their student training programmes in order to enhance patient safety and minimise medication error, as has already been done in medical undergraduate training.[20]

4.3 Study Limitations

There are some limitations to this study which should be considered when assessing the study data. First, both interviews and attitude surveys rely on self-report and as such are subject to both participant bias and accuracy of recall. Second, the statistical power of the survey may be somewhat limited given the relatively modest sample size ($n = 62$); this was due to recruitment difficulties. Third, the majority of participants in the qualitative interviews were female, thus the data should be considered to be most representative of the perspective of the female, as opposed to the male, pharmacist.

5. Conclusion

The results reported within this paper mirror those reported within other healthcare disciplines; namely that non-technical skills are an important aspect of job performance. From interviews with experienced pharmacists the main non-technical skill categories which were reported as important for a pharmacist to acquire, in order to achieve safe and effective practice, were: situational awareness, leadership, decision-making, teamwork and task management. The survey data indicates that teamwork and leadership skills are potentially problematic skills within that skill set, that may need to be addressed through future training programmes.

Identifying the non-technical skills that are unique to pharmacists is the first positive step towards the development of a training system, based on a behavioural rating scale, which could enhance the non-technical skills of pharmacists and therefore potentially improve levels of patient safety.

References

1. Aronson, JK. Medication errors: definitions and classification. *British Journal of Pharmacology* 2009; 67: 599-604.

2. Williams, DJP. (2007). Medication errors. *J R Coll Physician* 2007; 37: 3343-346.

3. Cousins D. *Safety in Doses: Improving the Use of Medicines in the NHS*. London: National Patient Safety Agency, 2007.

4. James KL *et al*. Incidence, type and causes of dispensing errors: a review of the literature. *Int J Pharm Pract* 2009; 17: 9–30.

5. Irwin A, Ross J, Seaton J, Mearns K. Retrospective analysis of DATIX dispensing error reports from Scottish NHS hospitals. *Int J Pharm Prac* 2011: 19; 417-423.

6. Peterson GM *et al*. Pharmacist's attitudes towards dispensing errors: their causes and prevention. *J Clin Pharm Ther* 1999; 24: 57–71.

7. Lambert BL *et al*. Effect of orthographic and phonological similarity on false recognition of drug names. *Soc Sci Med* 2001; 52: 1843–1857.

8. Phipps DL, Noyce PR, Parker D, Ashcroft DM. Medication safety in community pharmacy: a qualitative study of sociotechnical context. *BMC Health Services Research* 2009: 9; 158-165.

9. Carayon P. Human factors of complex sociotechnical systems. *Applied Ergonomics* 2006: 37; 525-535.

10. Szeinbach S, Seoane-Vazquez E, Parekh A, Herderick M. Dispensing errors in community pharmacy: perceived influence of sociotechnical factors. *Int J Qual Health Care* 2007: 19; 203-209.

11. Holford, D. & Schulz, R. Effect of technical and functional quality on patient perceptions of pharmaceutical service quality. *Pharmaceutical Research* 1999: 16; 1344 – 1351.

12. Dobson RT, Henry CJ, Taylor JG, Zello GA. *et al.* Interprofessional healthcare teams: Attitudes and environmental factors associated with participation by community pharmacists. *Journal of Interprofessional Care* 2006: 20; 119 – 132.

13. Albsoul-Younes AM, Hammad EA, Yasein NA, Tahaineh LM. Pharmacy-physician collaboration improves blood pressure control, *Saudi Medicine Journal* 2011: 32; 288 – 292.

14. Muenster SJ, Carter BL, Weber CA, Ernst ME *et al.* Description of pharmacist interventions during physician – pharmacist co-management of hypertension, *Pharm World Sci* 2008: 30; 128 – 135.

15. Nau DP, Ponte CD. Effects of a community pharmacist-based diabetes patient-management programme on intermediate clinical outcome measures, *J Managed Care Pharm* 2002: 8; 48 – 53.

16. Fletcher G, Flin R, McGeorge P, Glavin R. *et al.* Anaesthetists non-technical skills (ANTS): evaluation of a behavioural marker system, *British J Anaesthesia* 2003: 90; 580 – 588.

17. Flin R, O'Connor P, Crichton M. *Safety at the Sharp End: A Guide to Non-Technical Skills.* Aldershot, UK: Ashgate; 2008.

18. Yule S, Flin R, Paterson-Brown R, Maran N. *et al.* Development of a rating system for surgeons non-technical skills, *Medical Education* 2006: 40; 1098-1105.

19. Mitchell L, Flin R, Yule S, Mitchell J. *et al.* Thinking ahead of the surgeon. An interview study to identify scrub nurses' non-technical skills. *Int J Nursing Studies* 2011: 48; 818-828.

20. Flin R, Patey R. Improving patient safety through training in non-technical skills. *BMJ* 2009: 339; b3595

21. Manser T. Teamwork and patient safety in dynamic domains of healthcare: a review of the literature, *Acta Anaesthesiology Scandinavia* 2009: 53; 143 – 151.

22. Irwin A, Laing C, Mearns K. Dealing with aggressive methadone patients in community pharmacy: a critical incident study. *Research in Social and Administrative Pharmacy,*

23. Heinemann GD, Schmitt MH, Farrell MP, Brallier SA. Development of an attitudes toward health care teams scale, *Evaluation Health Professions* 1999: 22; 123 – 142.

24. Curran VR, Sharpe D, Forristall J. Attitudes of health sciences faculty members towards interprofessional teamwork and education, *Medical Education* 2007: 41; 892 - 896.

25. Flanagan JC. The critical incident technique. *Psychol Bull* 1954; 51: 327-358.

26. Butterfield LD, Borgen WA Amundsen NE *et al,* Fifty years of the critical incident technique: 1954-2004 and beyond. *Qual Res* 2005; 5: 475-497.

27. Battles J. *TeamSTEPPS Teamwork Perceptions Questionnaire (T-TPQ) Manual.* American Institutes for Research 2010. Washington.

28. Sexton JB, Thomas EJ. *The Safety Attitudes Questionnaire (SAQ) Guidelines for Administration.* University of Texas, Centre for Excellence in Patient Safety. Texas.

29. Francis JJ, Johnstone M, Robertson C, Glidewell L, *et al.* What is an adequate sample size? Operationalising data saturation for theory based interview studies. *Psychol Health* 2010: 25; 1229-1245.

30. Guest G, Bunce A, Johnson L. How many interviews are enough? An experiment with data saturation and variability. *Field Methods* 2006: 18; 59-82.

31. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Research Psychol* 2006: 3; 77-101.

32. Wauben LSGL, Dekker-Van Doorn CM, Wijngaarden JDH, Goossens RHM. *et al.* Discrepant perceptions of communication, teamwork and situation awareness among surgical team members. *Int J Qual Health Care* 2011: 23; 159-166.

33. Kalisch BH, Lee KH. The impact of teamwork on missed nursing care. *Nursing Outlook* 2010: 58; 233-241.

34. Shrader S, Kern D, Zoller J, Blue A. Interprofessional teamwork skills as predictors of clinical outcomes in a simulated healthcare setting. *J Applied Health* 2013: 42; 1E-6E.

35. Norden-Haag A, Kalvemark-Sporrong S, Linblad AK. Exploring the relationship between safety culture and reported dispensing errors in a large sample of Swedish community pharmacies. *BMC Pharmacology and Toxicology* 2012: 13;

36. Liu CS, White L. Key determinants of hospital pharmacy staff's job satisfaction. *Research in Social and Administrative Pharm* 2011: 7; 51-63.

37. Kunzle B, Kolbe M, Grote G. Ensuring patient safety through effective leadership behaviour: A literature review. *Safety Science* 2010: 48; 1-17.

38. Van C, Costa D. Abbott P, Mitchell B, Krass I. Community pharmacist attitudes towards collaboration with general practitioners: development and validation of a measure and a model. *BMC Health Services Research* 2012: 12; 320-333.

39. Dey RM, Vries MJW, Bosnic-Anticevich S. Collaboration in chronic care: unpacking the relationship of pharmacists and general medical practitioners in primary care. *Int J Pharm Pract* 2011: 19; 21-29.

40. Endsley MR. Toward a theory of situation awareness in dynamic systems. *Human Factors* 1995: 37; 32-64

41. Singh H, Giardina TD, Petersen LA, Smith MW. *et al.* Exploring situational awareness in diagnostic errors in primary care. *BMJ Quality and Safety* 2012: 21; 30-38.

42. Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A. *et al*. Shared decision making: a model for clinical practice. *J Gen Int Med* 2012: 27; 1361-1367.

Appendix 1

Interview questions:
1) Describe the team you work with when in your pharmacy
2) Who do you see as the leader of that team?
3) Do you generally work as part of the same team when in the pharmacy?
4) Briefly describe your main responsibilities while at work.
5) What sort of decisions do you have to make during your working hours?
6) If a decision is made which directly involves you but that you disagree with, do you challenge that decision, and if so how?
7) How do you keep track of the different prescriptions going through the pharmacy?
8) What factors affect the working atmosphere in the pharmacy?

9) What do you do to keep others in your team informed of what you are doing or requiring?

10) Describe the sorts of things you have to anticipate during pharmacy opening hours.

11) What cues do you look for to help you anticipate?