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Organisational factors associated with safety climate, patient satisfaction and self-reported medicines adherence in community pharmacies

Sally Jacobs[a,*], Mark Hann[b], Fay Bradley[a,1], Rebecca Elvey[a,2], Tom Fegan[a], Devina Halsall[c], Karen Hassell[a,3], Andrew Wagner[d], Ellen I. Schafheutle[a]

[a] Centre for Pharmacy Workforce Studies, Division of Pharmacy and Optometry, Faculty of Biology Medicine and Health, The University of Manchester, Manchester, UK
[b] Centre for Biostatistics, Division of Population Health, Health Services Research and Primary Care, Faculty of Biology Medicine and Health, The University of Manchester, Manchester, UK
[c] NHS England (North Region) Cheshire and Merseyside, Liverpool, UK
[d] NIHR Comprehensive Research Network – Eastern, Norwich, UK

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ABSTRACT

Background: Evidence suggests that community pharmacy service quality varies, and that this may relate to pharmacy ownership. However little is known about wider organisational factors associated with quality.
Objective: To investigate organisational factors associated with variation in safety climate, patient satisfaction and self-reported medicines adherence in English community pharmacies.
Methods: Multivariable regressions were conducted using data from two cross-sectional surveys, of 817 pharmacies and 2124 patients visiting 39 responding pharmacies, across 9 diverse geographical areas. Outcomes measured were safety climate, patient satisfaction and self-reported medicines adherence. Independent variables included service volume (e.g. dispensing volume), pharmacy characteristics (e.g. pharmacy ownership), patient characteristics (e.g. age) and areal-specific demographic, socio-economic and health-needs variables.
Results: Valid response rates were 277/800 (34.6%) and 971/2097 (46.5%) for pharmacy and patient surveys respectively. Safety climate was associated with pharmacy ownership ($F_{8,225} = 4.36$, $P < 0.001$), organisational culture ($F_{4,225} = 12.44$, $P < 0.001$), pharmacists' working hours ($F_{4,225} = 2.68$, $P = 0.032$) and employment of accuracy checkers ($F_{4,225} = 4.55$, $P = 0.002$). Patients' satisfaction with visit was associated with employment of pharmacy technicians ($\beta = 0.0998$, 95%CI = [0.0070,0.1926]), continuity of advice-giver ($\beta = 0.2593$, 95%CI = [0.1251,0.3935]) and having more reasons for choosing that pharmacy ($\beta = 0.3943$, 95%CI = [0.2644, 0.5242]). Satisfaction with information received was associated with continuity of advice-giver (OR = 1.96, 95%CI = [1.36, 2.82]), weaker belief in medicines overuse (OR = 0.92, 95%CI = [0.88, 0.96]) and age (OR = 1.02, 95%CI = [1.01, 1.03]). Regular deployment of locums by pharmacies was associated with poorer medicines adherence (OR = 0.50, 95%CI = [0.30, 0.84]), as was stronger patient belief in medicines overuse (OR = 0.88, 95%CI = [0.81, 0.95]) and younger age (OR = 1.04, 95%CI = [1.01, 1.07]). No patient outcomes were associated with pharmacy ownership or service volume.
Conclusions: This study characterised variation in the quality of English community pharmacy services identifying the importance of skill-mix, continuity of care, pharmacy ownership, organisational culture, and patient characteristics. Further research is needed into what constitutes and influences quality, including the development of validated quality measures.

* Corresponding author. Centre for Pharmacy Workforce Studies, Division of Pharmacy and Optometry, Faculty of Biology Medicine and Health, Room 1.124 Stopford Building, University of Manchester, Oxford Road, Manchester, M13 9PT, UK.
E-mail address: sally.jacobs@manchester.ac.uk (S. Jacobs).
[1] Health Services Research Centre, Alliance Manchester Business School (AMBS), The University of Manchester, Manchester, UK.
[2] Collaboration for Leadership in Applied Health Research and Care Greater Manchester, Centre for Primary Care, Division of Population Health, Health Services Research and Primary Care, Faculty of Biology Medicine and Health, The University of Manchester, Manchester, UK.
[3] West Coast University School of Pharmacy, Center for Graduate Studies, Los Angeles, CA, 90004, US.

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Introduction

The quality and safety of healthcare is known to vary across provider organisations in many countries in hospital[1–3] and primary care[4–6] settings. Furthermore, a range of organisational characteristics, such as size, ownership, leadership style and staffing, have been shown to be associated with variation in healthcare quality, although the evidence is inconclusive.[7] The research evidence from primary care is particularly sparse, although studies of United Kingdom (UK) General Medical Services quality and outcomes framework (QOF) data have found that some general practice characteristics, e.g. size, patient-practitioner ratio, staffing levels and team climate, may be associated with variation in performance.[5,8–11] Erosion of public trust in the quality and safety of healthcare systems,[12] coupled with rising healthcare demand and budgetary constraints, have pushed healthcare quality to the forefront of the policy agenda. This is particularly the case in the United States (US) and UK, where quality is increasingly measured and monitored in primary and secondary healthcare settings to identify areas for improvement and to reward good practice.[13,14] However, despite an increasing awareness of variability in service quality in community pharmacy, it is not monitored routinely nor is there a good understanding of how it may be improved.

UK community pharmacies are for profit organisations ranging from independently-owned pharmacies with 1–5 branches ('independents'), through small-/medium-sized chains, to pharmacies belonging to large national chains ('multiples') and supermarkets. They provide publicly-funded healthcare under contract to the National Health Service (NHS) and local authorities alongside a range of products and services for customer purchase. Since 2005, the English contractual framework for community pharmacy (with variations on this introduced for Scotland, Wales and Northern Ireland) has included dispensing of prescriptions and also an increasing range of medicines-related healthcare (e.g. medicines use reviews (MURs), a pharmacist consultation to improve a patient's understanding of and adherence to their medicines) and public health services. Pharmacy multiples provide a greater volume of services than independents.[15–17] However, there are growing concerns, particularly in relation to some corporate organisations, that workload pressures, staff shortages and a focus on profit, may adversely affect service quality.[15,18,19] There is increasing recognition that this sector should contribute to the wider healthcare quality agenda.[20,21] However, it is not clear which organisational characteristics within different pharmacy types are associated with the existing variation in service quality which is a barrier to organisational development within this sector which could improve quality. Moreover, a lack of reliable and validated quality measures,[22] insufficient resources within commissioning organisations and issues around the commercial sensitivity of data have all hampered developments.

Since the seminal definition of healthcare quality in terms of structures, processes and outcomes was published by Donabedian in the 1960s,[23] a number of quality frameworks have been developed and adopted by healthcare researchers and policymakers. The US Institute of Medicine proposed 6 features of high quality healthcare services: safe, effective, patient-centred, timely, efficient and equitable.[14] Campbell et al. suggested that there are two key domains of quality: accessibility and effectiveness.[5] The NHS in the UK has widely espoused a model of healthcare quality covering patient safety, patient experience and clinical effectiveness.[13] Research has shown all 3 to be consistently related, suggesting that any examination of healthcare quality should consider all 3 together.[24] Adopting this model of healthcare quality, as part of a larger, mixed methods study investigating the organisational factors associated with variation in clinical productivity in English community pharmacies,[25] this paper reports findings from two linked surveys of pharmacies and patients, to examine the associations between organisational characteristics and the quality of community pharmacy provision in terms of safety climate (patient safety), patient satisfaction (patient experience) and self-reported medicines adherence (clinical effectiveness).

Methods

Study design

This was a cross-sectional observational study involving 2 linked/nested surveys, 1 of community pharmacies and 1 of pharmacy patients.

Setting

The study was conducted in 2014, in 9 geographically diverse primary care administrative areas, purposively selected to cover a range of affluent/deprived areas of dense/sparse populations.

Participants

All community pharmacies located within the 9 study areas were included in the pharmacy survey (n = 817) bar those belonging to 4 national chains which had declined to participate (approx. 40% of original sample). Contact details were obtained from NHS healthcare commissioners (administrative bodies responsible for the planning and commissioning of healthcare in localities), with permission of local pharmaceutical committees (LPCs; community pharmacy representative bodies responsible for negotiating local services with healthcare commissioners and providing advice to community pharmacies) and the questionnaire addressed to the pharmacist/pharmacy manager.

Forty-one community pharmacies were randomly selected – stratified by study area and pharmacy ownership type (independent, small/medium chain, large multiple/supermarket) – from pharmacy survey respondents (n = 277) and invited to participate in the patient survey. Where a selected pharmacy declined to participate, they were substituted by another randomly chosen pharmacy of the same type, from the same study area. If pharmacies of a particular type were used up, a 'next best' (by organisational type and area) approach was taken to maintain the overall distribution of the sample. This was applied in one instance where an independent pharmacy was replaced by a small chain pharmacy in the same area.

Each pharmacy was asked, following training, to distribute a self-completion questionnaire to 2 samples of 30 consecutive walk-in patients (aged 18 + years) following receipt of either a) a dispensed prescription or b) an MUR.

Power calculations

The pharmacy survey sample size was determined *a priori* to have 90% power to detect a correlation as small as 0.16 between organisational factors and service volume (the primary outcome used in another part of the study, unrelated to this paper),[16] based on a 5% level of statistical significance and assuming a non-response rate of 50% (77% power assuming a non-response rate of 66%). An ideal power may commonly be considered to be between 80 and 90%.

For the patient survey, the sample size calculation was based on detecting a 2 point difference in patient-average satisfaction with information about medicines (SIMS) scores (see description of outcome measure below) between any pair of ownership types. Assuming that the population standard deviation of SIMS scores is 5 points, in 40 pharmacies, 30 patients per pharmacy would be required to detect such a difference with 80% power, at the 5% level of statistical significance. Assuming, further, a non-response rate of 50%, 2400 patients in total would need to be surveyed (1,200 having had a prescription dispensed and 1,200 having had a MUR).

Variables and data sources

The primary outcome measures chosen for this study as measures of service quality (in terms of patient safety, patient experience and

clinical effectiveness) were all selected on the basis of the limited availability of validated tools. Permission for use was granted by all respective authors.

As a measure of patient safety, data on safety climate were collected as part of the pharmacy survey using the validated Pharmacy Safety Climate Questionnaire (PSCQ)[26] which captures the pharmacy's collective attitudes and behaviours regarding patient safety. Twenty-four items, scored on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), elicit 4 domains of safety climate: organisational learning (13 items; range 1–53; willingness to develop and maintain safety), blame culture (4 items; range 1–20; propensity to blame individuals following an incident), working conditions (4 items; range 1–17; extent to which working environment supports safe working) and safety focus (3 items; range 1–13; priority given to safety in day-to-day work). Higher domain scores correlate with safer working conditions except 'blame culture' (reverse scored). Details of the content and distribution of the pharmacy questionnaire are published elsewhere.[16] Information was also collected on the key organisational characteristics to be used as independent variables in the analysis and which have been shown in previous research to influence care provision.[15,27–33] These included items on:

- Ownership type (supermarket, multiple (>200 branches), medium chain (26–200 branches), small chain (6–25 branches), independent (<6 branches));
- location (geographical and physical);
- contract and opening hours;
- staffing and skill-mix (numbers and types of pharmacists and other pharmacy staff);
- use of locums (number, frequency and regularity of locum use);
- working hours/patterns of main pharmacist (hours worked/week; shift patterns);
- management structure (pharmacy manager is pharmacist or not; pharmacist managed by pharmacist or non-pharmacist);
- pharmacist/GP integration; and
- organisational culture, measured using a validated 3-item (1–10) semantic differential scale (Pharmacy Service Orientation (PSO)[34]) capturing respondents' perceptions of their pharmacy's 'orientation' (patient-product), 'focus' (quality-quantity) and pharmacist's work (professional-technical). The mean of the 3 items was calculated, with higher PSO scores indicating greater alignment to the pharmaceutical care paradigm.

Two validated outcome measures of patient experience, a general community pharmacy patient satisfaction scale[35] and the Satisfaction with Information about Medicines Scale (SIMS),[36] were included in the patient survey. The patient satisfaction scale lists 15 statements on a 5-point Likert rating scale (1 = strongly disagree, 5 = strongly agree), with a 'not applicable' option (scored 3, equivalent to 'neither agree nor disagree'). Following re-coding of 2 reverse-scored items, the mean item response was calculated to give an overall satisfaction score (1–5), with higher scores indicating higher levels of self-reported satisfaction with the pharmacy visit. The SIMS lists 17 statements rated according to the amount of information received: responses indicating satisfaction ('about right' or 'none needed') scoring 1 and responses indicating dissatisfaction ('too much', 'too little' or 'none received') scoring 0. These were summed to give a total satisfaction score (0–17), where higher scores indicate higher levels of self-reported satisfaction with information received. Due to a highly negatively skewed distribution, this score was recategorised (0–5; 6–10; 11–16; 17).

The final quality outcome measure selected for this study was the validated Medication Adherence Report Scale (MARS),[37] used as a measure of clinical effectiveness. The MARS lists 5 statements rated according to the frequency with which respondents engage in non-adherent behaviour. Responses are scored from 1 (always) to 5 (never) and summed (5–25), where higher scores indicate higher levels of self-reported adherence. Due to a highly negatively skewed distribution, this score was dichotomised (≤20 = 'low adherers'; >20 = 'high adherers').

The 8-sided patient questionnaire distributed by the pharmacist/pharmacy staff in each participating pharmacy and returned directly to the research team using a reply-paid envelope (no follow-up), also collected the following patient characteristics used as independent variables in the analysis:

- Reasons for visiting the pharmacy (service received, usual pharmacy or not, choice of pharmacy)
- Medication and information/advice received (number of medicines taken, new or repeat medication received, nature of information/advice received, category and continuity of advice-giver)
- Beliefs about Medicines Questionnaire (BMQ)[38]
- Background data (socio-demographic, existing conditions)

The BMQ lists eight statements which respondents are asked to rate according to the strength of their views about medicines in general as follows: 'strongly agree', 'agree', 'uncertain', 'disagree', 'strongly disagree'. Responses are scored from 5 (strongly agree) to 1 (strongly disagree). Two scales ('general harm' and 'general overuse'), ranging from 4 to 20, were derived through summation of four of these items each, where higher scores indicate stronger beliefs that medicines are harmful or that medicines are overused by doctors, respectively.

Both questionnaires were piloted with convenience samples of 9 community pharmacists and 9 pharmacy users, using cognitive interviewing.[39] The questions were re-drafted, through an iterative process, during the cognitive interviewing period, to allow suggested changes to be piloted in later interviews.

Pharmacy level service activity data (dispensing, MUR volume) for April 2012–March 2013 (the most recent financial year with a full set of data available) were obtained, with appropriate approvals, from the NHS Business Services Authority. In addition, determinants of the demographic, socioeconomic and health needs status of local populations (super output areas) were obtained from national secondary datasets.[16] Independent variables from these datasets were also examined for associations with the primary outcomes.

Pharmacy survey data were linked by pharmacy premises postcode and organisational code to service activity and socio-demographic and health needs data. This combined dataset was linked to data from the patient questionnaire using the pharmacy premises organisational code. All data were anonymised post linkage.

Analysis

A series of multivariable regression analyses on each of the four outcome variables (PSCQ, patient satisfaction, SIMS and MARS) were conducted (STATA v.13[40]). The unit of analysis for the PSCQ was the pharmacy. For overall patient satisfaction, SIMS and MARS, the unit of analysis was the patient. Patients were clustered within pharmacies and this multi-level structure was taken into account in analyses. Independent variables included service volume (e.g. dispensing volume), pharmacy characteristics (e.g. pharmacy ownership, organisational culture, skill-mix), patient characteristics (e.g. age, pharmacy use, belief in medicines overuse) and areal-specific demographic, socio-economic and health-needs variables, derived from the pharmacy survey, patient survey and secondary datasets as described above. Where applicable, regression models controlled for the type of questionnaire distributed (dispensing or MUR).

Because of the large number of independent variables, univariable multivariate linear (for PSCQ), linear (for overall satisfaction), ordered logistic (for SIMS) or binary logistic (for MARS) regression models were first fitted to determine which pharmacy-level organisational variables, patient variables and/or areal-specific demographic, socio-economic and health-needs variables were associated with each outcome. To prevent exclusion of any potentially significant predictors (at $p < 0.05$)

in the final multivariable models, a conservative p-value of 0.2 was employed to indicate a significant association in univariable analyses, as is common statistical practice. For each outcome, independent variables meeting this criterion were then included in an appropriate multivariable regression model to determine if their association persisted upon controlling for other factors. Study site and pharmacy ownership type were added to the model at this point. Variables were retained in the 'final' model, along with ownership type and study site and after removal of collinear ones, if significance at $p = 0.05$ was then achieved.

Data weighting

In the analysis of the pharmacy survey data, probability weights were applied to make the sample of respondent pharmacies more representative of the population of pharmacies in their area. The weight was calculated as the ratio of the number of each pharmacy type within the locality to the number of each pharmacy type within the locality who responded to the survey (i.e. the inverse of the probability of response). For the patient survey, weights were created that represented only the responses of the patients from the individual participating pharmacies. The resulting weight (which was equivalent for each patient attending the same pharmacy) was derived as the inverse of the ratio of the percentage of the overall response at each pharmacy to the percentage of the dispensing volume reported at each pharmacy, used as a proxy for population size. The denominator here was the total number of items dispensed across the participating pharmacies.

Ethical approval

Ethical approval was obtained from the National Research Ethics Service (NRES) (13/WM/0137), endorsed by the University of Manchester Research Ethics Committee (13025).

Results

Survey response rates and sample characteristics

Of 817 pharmacy questionnaires distributed, 285 were returned completed with 9 returned undelivered. Eight questionnaires completed by distance selling pharmacists were excluded, giving a valid response rate of 277/800 (34.6%).

Seventy-eight responding pharmacies were approached to participate in the patient survey; 39 were recruited (10 independents; 15 small/medium chains; 14 large multiples/supermarkets) across the 9 study areas. Participating pharmacies distributed 2124 patient questionnaires: 1160 to patients having prescriptions dispensed and 964 to those receiving MURs. Of these, 1008 were returned (total response rate 47.5%): 546 from the dispensing sample (47.1%), 462 from the MUR sample (47.9%).Thirty-seven questionnaires were excluded having been completed by individuals visiting the pharmacy on another person's behalf, giving a valid response rate of 971/2087 (46.5%).

Descriptive statistics for the organisational characteristics of pharmacy survey respondents (independent organisational variables) have been reported previously.[16] The characteristics of patient survey respondents (independent patient variables) are reported in Table 1.

Patient survey respondents were aged 18–93 years, averaging around 65 years. Slightly more women than men responded. Most indicated that they had at least 1 long-term condition, 70% indicating they had 2 or more.

Respondents were asked to select the reason(s) why they chose to visit that particular pharmacy. Nine options were available – 3 related to ease of *access*, 4 to quality of *service*, and 2 to value/range of *products*. Most (93.7%) selected a reason relating to access; 3/4 (74.8%) selected a reason relating to service; and 15.2% selected a product-related response. Just over half indicated that the reasons for their visit spanned 2 of these categories with only around 1 in 7 selecting reasons from all 3 categories.

Table 1
Characteristics of patients responding to survey and this pharmacy visit.

Variable		Sample data	n
Why did you choose this pharmacy on this occasion? Reponses categorised as 'ease of access', 'quality of service' or 'range of products' (Number of selected categories)	1	287 (30.6%)	939
	2	518 (55.2%)	
	3	134 (14.3%)	
How many medicines are you currently being prescribed?	1	86 (8.9%)	962
	2–3	281 (29.2%)	
	4–10	527 (54.8%)	
	More than 10	68 (7.1%)	
Received medicine(s) for first time?	No	750 (78.5%)	956
	Yes	206 (21.5%)	
Who did you receive information/advice from?	Don't Know/NA	459 (50.4%)	911
	Pharmacist only	380 (41.7%)	
	Other Staff combination	72 (7.9%)	
Do you usually receive information/advice from the same person?	Don't Know/NA	167 (17.5%)	952
	No	281 (29.5%)	
	Yes	504 (52.9%)	
Overuse of Medication (BMQ)	Mean (SD)	10.9 (3.1)	890
	Median (IQR)	11 (9, 13)	
	Range	4–20	
Harm from Medication (BMQ)	Mean (SD)	8.8 (2.9)	896
	Median (IQR)	9 (7, 10.5)	
	Range	4–20	
Gender	Female	502 (52.2%)	961
	Male	459 (47.8%)	
Age (years)	Mean (SD)	64 (14.5)	957
	Range	18–93	
Number of Long-Term Conditions	0	68 (7.0%)	968
	1	217 (22.4%)	
	2	249 (25.7%)	
	3	200 (20.7%)	
	4	131 (13.5%)	
	≥5	103 (10.6%)	

More than half of these pharmacy patients were currently prescribed 4 or more medicines with just over 1/5 receiving a new medicine during that visit. Approximately half had either received no information about their medication or were unable to identify which member of pharmacy staff they received information from. A further 2/5 had received information or advice from the pharmacist. Around half usually received information or advice from the same person in the pharmacy.

The mean score on the overuse of medication scale of the BMQ was around 11, slightly lower (i.e. weaker beliefs that medicines are overused by doctors) than values reported elsewhere.[38] The mean score on the harm from medication scale of the BMQ was around 9, again slightly lower (i.e. weaker beliefs that medicines cause harm) than reported previously. Both scales were strongly correlated ($r = 0.68$), therefore only the 'overuse' subscale was fit in subsequent regressions to avoid problems with collinearity.

Safety climate (PSCQ)

Mean (standard deviation (SD)) values for each of the 4 domains of the PSCQ (organisational learning; blame culture; working conditions; safety focus) were 40.32 (7.19), 5.06 (2.82), 11.72 (3.06) and 9.80 (1.94), respectively, very close to published normative values.[41] The final (significant independent variables only) multivariable multivariate linear regression model for all 4 domains of the PSCQ is reported in Table 2.

Taking into account the reverse scoring of 'blame culture', respondents who were pharmacy owners/managers reported a more favourable (safer) safety climate than other employee pharmacists.

Table 2
Final multi-variable multivariate linear regression model of safety climate (PSCQ domains) for pharmacy survey respondents (n = 237).

Patient Safety Climate (PSCQ)		Multi-Variable Model				
		Organisational Learning	Blame Culture	Working Conditions	Safety Focus	Composite Hypothesis Test
Job Title	Pharmacist	Reference[1]				$F_{4,\ 225} = 3.65$
	Owner/Manager	1.74 (−0.51, 3.98)	−0.90 (−1.81, 0.00)	1.73 (0.80, 2.65)	0.64 (0.01, 1.28)	P = 0.007
Accuracy Checking Technician (ACT)*	No	Reference				$F_{4,\ 225} = 4.55$
	Yes	−0.87 (−2.72, 0.98)	0.38 (−0.36, 1.13)	−0.97 (−1.73, −0.20)	−1.01 (−1.53, −0.49)	P = 0.002
Work Pattern of Main Pharmacist	Standard Hours (8am-6pm)	Reference				$F_{4,\ 225} = 2.61$
	Non-Standard	1.03 (−0.77, 2.83)	−0.70 (−1.43, 0.03)	−0.13 (−0.87, 0.61)	0.69 (0.18, 1.20)	P = 0.037
Average Daily Working Hours of Main Pharmacist	(1 Hour change)	−0.37 (−1.19, 0.46)	0.03 (−0.30, 0.37)	−0.51 (−0.85, −0.17)	−0.17 (−0.41, 0.06)	$F_{4,\ 225} = 2.68$ P = 0.032
Organisational Culture (PSO)	(1 Unit change)	2.11 (1.49, 2.73)	−0.40 (−0.65, −0.15)	0.46 (0.21, 0.72)	0.39 (0.21, 0.56)	$F_{4,\ 225} = 12.44$ P < 0.001
Relationship with nearest GP Surgery	Very Good	Reference				$F_{12,\ 225} = 2.44$
	Good	−1.43 (−3.44, 0.60)	1.02 (0.20, 1.84)	−0.23 (−1.06, 0.61)	−0.32 (−0.89, 0.26)	P = 0.005
	Satisfactory/Poor/None	−3.09 (−5.38, −0.80)	1.18 (0.25, 2.11)	−0.60 (−1.54, 0.35)	−1.08 (−1.73, −0.43)	
	No GP Surgery identified	−6.31 (−10.6, −2.07)	3.03 (1.32, 4.75)	−1.11 (−2.85, 0.63)	−0.60 (−1.80, 0.61)	
Type of Pharmacy	Independent	Reference				$F_{8,\ 225} = 4.36$
	Small/Medium Multiple	1.99 (−0.56, 4.54)	−0.56 (−1.59, 0.47)	0.39 (−0.66, 1.44)	0.17 (−0.55, 0.89)	P < 0.001
	Large Mult./Supermarket	2.07 (0.18, 3.95)	0.27 (−0.50, 1.03)	−1.64 (−2.42, −0.87)	0.01 (−0.53, 0.54)	

* accuracy checking technician (ACT): pharmacy technician or other member of the pharmacy team qualified to conduct the final accuracy check on dispensed prescription.

Compared to independent pharmacies, large multiple and supermarket pharmacies had more favourable 'organisational learning' scores but less favourable scores for 'working conditions'. A pharmacy's organisational culture (PSO score) was also significantly associated to its perceived safety climate, with cultures more closely aligned to the patient, quality and professional work associated with a more favourable safety climate across all 4 domains than those more closely aligned to the medicine, quantity and technical work.

Pharmacies employing an accuracy checking technician (ACT) had a significantly less favourable safety climate, particularly with respect to 'working conditions' and 'safety focus'. In those where the main pharmacist worked non-standard hours (e.g. shift work, extended working days), more favourable 'safety focus' scores were achieved. However, as the average daily working hours of the main pharmacist increased, 'working conditions' scores deteriorated.

Finally, with respect to pharmacy-GP surgery relationships, any deviation from 'very good' resulted in increasingly less favourable reported PSCQ scores.

Satisfaction with visit

The mean (SD) item score for satisfaction with visit was 3.81 (0.59), higher than reported elsewhere.[35] The final multivariable linear regression model for satisfaction with pharmacy visit is reported in Table 3.

Patient characteristics such as age, gender, and number of long-term conditions were not significantly associated with satisfaction. However, strength of their belief in the overuse of medication (BMQ score) was, with more strongly held beliefs significantly associated with decreasing satisfaction.

Patients who indicated a greater number of reasons for choosing the pharmacy they visited were significantly more satisfied, as were those who usually received information or advice from the same person (compared to those who did not) and those receiving information/advice from the pharmacist or other member of staff (compared to those who did not know or had not received any information). Significantly higher levels of patient satisfaction were reported from pharmacies which employed a pharmacy technician.

Patient satisfaction was not significantly associated with pharmacy ownership type and, although univariable analysis had indicated an association between satisfaction and organisation culture, this relationship did not persist in the multivariable model.

Satisfaction with information received about medicines (SIMS)

Summed SIMS scores ranged from 0 to 17 but were highly skewed with a median (inter-quartile range (IQR)) score of 17 (12–17). The final multivariable ordered logistic regression model for SIMS score is reported in Table 4.

Satisfaction with information received about medication increased with patients' age and SIMS scores were also higher for pharmacies located in areas with older populations. SIMS score decreased with increasing belief that medicines were overused (BMQ score). Patients usually receiving information or advice from the same person were significantly more satisfied with information received than those who did not.

Satisfaction with information received about medicines was significantly related to pharmacy ownership type, with SIMS scores originating from small and medium chain pharmacies significantly higher than those from independents.

Self-reported medicines adherence (MARS)

MARS scores ranged from 5 to 25 but were highly skewed with a median (IQR) score of 24 (22–25). The final multivariable binary logistic regression model for MARS score is reported in Table 5.

Table 3
Final multi-variable linear regression model of satisfaction with pharmacy visit for patient survey respondents (n = 720).

Patient satisfaction scale		Multi-Variable Model		
		Coefficient	95% C.I.	p
Pharmacy Contract held	Standard 40 Hours	Reference		0.001
	100 Hours	−0.0052	−0.1925, 0.1821	
	Other	0.1771	0.0867, 0.2675	
Registered Pharmacy Technician	No	Reference		0.036
	Yes	0.0998	0.0070, 0.1926	
Why did you choose this pharmacy on this occasion? (Number of selected categories)	1	Reference		<0.001
	2	0.2235	0.1049, 0.3421	
	3	0.3943	0.2644, 0.5242	
Who did you receive information/advice from?	Don't Know/NA	−0.2141	−0.3139, −0.1143	
	Pharmacist only	Reference		<0.001
	Other Staff combination	0.1235	−0.0308, 0.2779	
Do you usually receive information/advice from the same person?	Don't Know/NA	−0.0492	−0.1463, 0.0479	
	No	Reference		<0.001
	Yes	0.2593	0.1251, 0.3935	
Overuse of Medication (BMQ)	(1 unit change)	−0.0293	−0.0494, −0.0092	0.005
Volume MURs	≤12	−0.2545	−0.3631, −0.1448	
	13–200	−0.0007	−0.1191, 0.1177	
	201–365	−0.0270	−0.1087, 0.0548	
	>365	Reference		<0.001

Table 4
Final multi-variable ordered logistic regression model of satisfaction with information received about medicines (SIMS) for patient survey respondents (n = 778).

Satisfaction with Information about Medicines Scale (SIMS)		Multi-Variable Model		
		Odds Ratio	95% C.I.	p
Mean Age (population)	(1 Year change)	1.07	1.02, 1.12	0.002
Do you usually receive information/advice from the same person?	Don't Know/NA	1.72	0.98, 3.01	
	No	Reference		0.001
	Yes	1.96	1.36, 2.82	
Overuse of Medication (BMQ)	(1 unit change)	0.92	0.88, 0.96	<0.001
Patient Age	Linear Component	1.02	1.01, 1.03	0.002
	Quadratic Component	1.00	1.00, 1.00	
Volume MURs	≤12	0.15	0.08, 0.29	
	13–200	0.79	0.49, 1.27	
	201–365	0.72	0.49, 1.07	
	>365	Reference		<0.001
Type of Pharmacy	Independent	Reference		0.008
	Small/Medium Multiple	1.88	1.13, 3.11	
	Large Mult./Supermarket	1.15	0.68, 1.94	

Table 5
Final multi-variable binary logistic regression model of self-reported medication adherence (MARS) for patient survey respondents (n = 775).

Medication Adherence Report Scale (MARS)		Multi-Variable Model		
		Odds Ratio	95% C.I.	p
Use of Locums	Not Regularly	Reference		0.008
	Regularly	0.50	0.30, 0.84	
Do you usually receive information/advice from the same person?	Don't Know/NA	2.50	1.20, 5.23	
	No	Reference		0.044
	Yes	1.45	0.73, 2.89	
Overuse of Medication (BMQ)	(1 unit change)	0.88	0.81, 0.95	0.002
Patient Age	Linear Component	1.04	1.01, 1.07	<0.001
	Quadratic Component	1.00	1.00, 1.00	

Self-reported medicines adherence (MARS classification) improved with age but decreased the more strongly held a patient's beliefs were that medicines were overused. Patients who did not usually receive information or advice from the same person were more likely to be classified as 'low adherers' than those who were unsure or who had received no information/advice. The only organisational characteristic significantly associated with self-reported adherence was use of locums, with patients who had visited pharmacies who regularly (on a daily/weekly basis) used locums significantly more likely to be classified as 'low adherers' according to their MARS score. There was no association with pharmacy type or service volume.

Discussion

This is the first study to characterise variation in service quality across English community pharmacies. Using validated measures of patient safety, patient experience and clinical effectiveness, the study explored the organisational factors associated with variation in quality. Data analysis from 2 linked surveys suggests that whilst pharmacy ownership and organisational culture were associated with safety climate, continuity of care and skill-mix may be more important for patient outcomes. No associations were detected between service volume and quality.

This study has some limitations. Generalisability was compromised by the nature of samples, with initial sampling of primary care administrative areas both purposive, ensuring geographical and socio-demographic spread, and pragmatic, using existing contacts to ensure access and support from local pharmacy representatives. Non-participation by 4 large multiples and a low response rate further threatened generalisability beyond the 9 study sites. However the distribution of pharmacy types and activity levels in the sample were comparable to national figures,[16] weights were applied to control for non-response bias and calculated statistical power was maintained.

Another important limitation relates to the lack of appropriate validated quality community pharmacy outcome measures. Safety climate (PSCQ) was used as an internationally validated proxy measure for patient safety rather than self-reported dispensing errors or near misses due to the likelihood of underreporting.[42] To capture patient experience, the validated but not widely used Tinelli et al. scale of patient satisfaction was selected.[35] The SIMS score,[22] despite its proven reliability and validity and wider use in research, produced a highly skewed

distribution of responses with a pronounced peak at 17 (the maximum value) making analysis more problematic. Self-reported medicines adherence is highly subjective and the measure used in this study (MARS)[23] produced a similarly skewed distribution. However, in the absence of other validated measures of clinical effectiveness appropriate for generic community pharmacy services, this was deemed the best approach. Despite this limitation, the study nonetheless captured the 3 key dimensions of healthcare quality predicated by current UK healthcare policy: patient safety, patient experience and clinical effectiveness.[13,24]

A final limitation may relate to the time elapsed between data collection (2014) and publication (2019). Whilst there have been no substantive changes to the organisations responsible for delivering English community pharmacy services in the past 5 years, there have been some small changes to the contractual framework and ever increasing demands on community pharmacies. In addition, the healthcare policy and commissioning landscape has changed with new commissioning bodies being established and changes to the way that some pharmacy services are provided to patients (e.g. the rapid expansion of general practice-based 'clinical' pharmacists). Nonetheless, we have no reason to believe that the associations between community pharmacy organisational characteristics and quality outcomes would have changed in this time.

The findings of this study highlight the importance of appropriate skill-mix to the quality of community pharmacy services, more so than overall staffing levels. Patients' satisfaction with their visit was greater in pharmacies employing a pharmacy technician. As community pharmacists' roles have become more clinical and workloads have increased, the need for appropriate skill-mix and pharmacy team members to substitute across a range of pharmacy roles has become increasingly important in several countries. Pharmacy technicians in particular have increasingly taken on responsibility for much of the dispensing process and elements of extended pharmacy services.[43] However, whilst pharmacy technicians are supportive of extended roles,[44,45] community pharmacists' views are more guarded around which tasks can be safely delegated.[44] The findings from the current study provide some of the first evidence of a positive influence on patient outcomes and may be as a result of pharmacy technicians freeing up pharmacists' time to be more patient-facing.

The inverse relationship between ACT employment and safety climate was unexpected. The training of technicians to conduct the final accuracy check is a development common to a number of countries (e.g. UK, US, New Zealand)[46,47] and can free up pharmacists' time for patient-focused activities.[48] Pharmacists remain reserved, however, about the safety implications[49] and this may be one explanation for this unexpected finding capturing pharmacists' views of safety climate. These findings are nevertheless important in the current UK health policy context[50]; as community pharmacists increasingly take on more clinical roles and responsibilities from GPs, so roles and responsibilities within the community pharmacy team will need to adapt.

Continuity of patient care – both in terms of continuity of advice-giver and in relation to the regular use of locum pharmacists – emerged as an important predictor of higher quality services from community pharmacies. The value placed on continuity of care in community pharmacy[19,51,52] reflects that seen in general practice.[53,54] Moreover, continuity of care with doctors has been shown to be associated with improved medication adherence,[55] fewer hospital admissions[56] and reduced mortality.[57] Patients in the UK (and most other countries) do not register with a specific community pharmacy, but almost 90% visit the same pharmacy all or most of the time,[58] even more for those with long-term conditions. The current findings are amongst the first to demonstrate that interpersonal continuity in community pharmacy services is not only important for patient satisfaction but may also influence clinical effectiveness in terms of medication adherence. This is an important finding for community pharmacies relying on locum pharmacists and those larger chains where regular rotation of pharmacists is common practice.

Whilst associated with safety climate, and in contrast to suggestions from previous research, pharmacy ownership type,[15,19] organisational culture[28] and service volume[59] were not significant predictors of any of the patient outcomes measured in the current study. This may appear reassuring: despite common perceptions that increasing community pharmacy workloads coupled with profit-focused working practices often associated with larger multiples, may be compromising patient safety and service quality, these findings suggest that pharmacy teams are managing to withstand these pressures without detriment to patients. However, non-participation of 4 of the largest UK multiples in this study has limited the extent to which it has been able to capture the full range of variation in some organisational characteristics (suggested by higher PSO (culture) scores in the current compared to previous surveys). Therefore, caution should be taken when interpreting these findings which should be viewed in the context of the wider evidence base.

By systematically investigating variation in safety climate, patient satisfaction and self-reported medicines adherence in English community pharmacies, this study has identified a number of organisational characteristics which may be influential. However, for community pharmacy organisations and commissioners to make evidence-informed decisions about how best to improve service quality and safety there is a need for further research. The extent to which the current study has captured service quality in English community pharmacies is limited by the availability of appropriate validated quality measures, particularly, the lack of generic (non-disease-specific) tools which measure patient outcomes beyond patient satisfaction.

Barriers to measuring quality in community pharmacy are not limited to research studies: service quality is not routinely or comprehensively monitored by commissioners or community pharmacy organisations themselves.[25] This is partly due to commercial sensitivities, with private sector organisations delivering public services, which has wider implications for transparency and accountability in health systems increasingly reliant on mixed economies.[60,61] In the absence of robust systems and methods for measuring or monitoring quality in community pharmacy, the opportunities for quality assurance or quality improvement are limited. NHS England recently introduced an element of pay-for-performance to the community pharmacy contractual framework, although with a limited evidence base.[21] An alternative approach to pay-for-performance may be to introduce payments for pharmacies engaging with quality improvement (QI) activities, such as the SafetyNET-Rx programme trialled in Canada.[62] Much can be learned from the English QOF, first introduced in 2004 and one of the most extensive pay-for-performance schemes. A recent review of the QOF has recommended not only the scaling back of indicators but also the introduction of a new quality improvement domain whereby practices are remunerated for specified QI activities rather than against outcome indicators.[63] There is clearly a need for further research to support the development of similar initiatives in community pharmacy.

To conclude, this study, the first to characterise variation in service quality in English community pharmacies according to their safety climate, the satisfaction of patients and patients' self-reported medicines adherence, has highlighted a need for the development not only of robust, validated tools to measure quality in community pharmacy but also of workable processes and systems for monitoring and improving quality within the sector.

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Appendix A. Supplementary data

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