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A review of evidence on the links between patient experience and clinical safety and effectiveness

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Title	A review of evidence on the links between patient experience and clinical safety and effectiveness
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Abstract

Objective: To explore evidence on the links between patient experience and clinical safety and effectiveness outcomes.

Design: Systematic review

Setting: A wide range of settings within primary and secondary care including hospitals and primary care centres.

Participants: A wide range of demographic groups and age groups.

Primary and secondary outcome measures: A broad range of safety and effectiveness outcomes including mortality, physical symptoms, length of stay and adherence to treatment.

Results: 55 articles met the inclusion criteria for this review. The evidence indicates consistent associations between patient experience, safety and effectiveness for a wide range of disease areas, settings, outcome measures and study designs. Evidence demonstrates associations between patient experience and adherence to medication and treatments; use of screening services; patient symptoms; hospitalization and length of stay; number of doctor visits; and immunizations. There is some evidence of associations between patient experience and blood pressure, pain and mortality.

Conclusion: The data presented shows associations between patient experience and clinical effectiveness and safety and supports the case for the inclusion of patient experience as one of the three pillars of quality. It suggests that improvement of patient experience will increase the likelihood of improvements in the other two domains. It supports the argument that the three measures should be looked at as a group and not in isolation. Clinicians should resist sidelining patient experience measures as too subjective or mood-orientated, divorced from the 'real' clinical work of measuring safety and effectiveness.

Trial registration: This review was not registered.

Introduction

Patient experience is increasingly recognized as one of three pillars of quality in healthcare alongside safety and clinical effectiveness. [1] In the NHS the measurement of patient experience data to identify strengths and weaknesses of health care delivery, drive quality improvement, inform commissioning and promote patient choice is now mandatory.[2 3 4] In addition to data on harm avoidance or success rates for treatments, providers are now assessed on aspects of care such as dignity and respect, compassion and involvement in care decisions. [4] In England these data are published in Quality Accounts and the Commissioning for Quality & Innovation (CQUINs) payment framework makes a proportion of care providers' income conditional on improvement in this domain. [5]

The inclusion of patient experience as a pillar of quality is often justified on the grounds of its intrinsic value – that the expectation of humane, empathic care is a given and requires no further justification.

It is also justified on more utilitarian grounds as a means of improving safety and effectiveness. [6] There are a number of aspects of care relevant to patient experience seen as relevant to health and safety outcomes.[7] For example, effective clinician-patient communication, through empathic, two-way communication with patients, respect for their beliefs and concerns and the conveyance of clear information will promote patient trust. This could benefit safety and effectiveness by promoting higher quality information exchange for both clinicians and patients creating an environment where patients may be more willing to disclose information. It can lead to greater patient engagement or 'ownership' of clinical decisions, with patients entering a 'therapeutic alliance' with clinicians. This could then support improved and more timely diagnosis, clinical decisions and advice and lead to potentially fewer unnecessary referrals or diagnostic tests.[8 9] Increased patient agency can encourage greater participation in personal care, increasing safety and effectiveness through compliance with medication, adherence to recommended treatment, monitoring of prescriptions and dose.[10 9] Patients can be informed about what to expect from treatment and motivated to report adverse events or complications and keep a list of their medical histories, allergies, and current medications. [11]

Patients' direct experience of care process directly through clinical encounters or as an observer (for example, as a patient on a hospital ward) can provide valuable insights into everyday care. Examples include attention to pain control, assistance with bathing or help with feeding, or the environment (cleanliness, noise, physical safety) or coordination of care between professions or organizations. Given the organizational fragmentation of much healthcare care and the numerous services with which many patients interact, the measurement of patient experience may provide a 'whole system' perspective not readily available from more discrete safety and effectiveness measures.[11]

Focusing on such utilitarian arguments, this study reviews evidence on links that have been demonstrated between patient experience and safety and effectiveness.

Methods

Two search methods were used to identify the evidence. The first was a search of a literature database (EMBASE) using predetermined search terms.

Patient experience is a term that encapsulates a number of dimensions and in preliminary database searches this phrase on its own uncovered a limited amount of studies.

To broaden and structure the search for evidence, identify search terms and provide a framework for analysis it was necessary to identify what patient experience entails and outline potential pathways through which it is proposed to impact on safety and effectiveness.

As such, we combined common elements from patient experience frameworks (The Institute of Medicine[1], Picker Institute[12] and NICE [13]), Table 1 delineates different dimensions of patient experience and distinguishes between 'relational' and 'functional' aspects.

Relational aspects refer to interpersonal aspects of care – the ability of clinicians to empathise, respect the preferences of patients, include them in decision making and provide information to enable self-care.[10] Patients expect professionals to put their interest above other considerations and be honest and transparent when something goes wrong. [8 14] Functional aspects relate to basic expectations about how care is delivered, such as attention to physical needs, timeliness of care, clean and safe environments and effective coordination between professionals.

Table 1: Identifying aspects of patient experience and search terms

Relational aspects	**Functional aspects**
Emotional and psychological support, relieving fear and anxiety, treated with respect, kindness, dignity, compassion, understanding Participation of patient in decisions and respect and understanding for beliefs, values, concerns, preferences and their understanding of their condition Involvement of, and support for family and carers in decisions Clear, comprehensible information and communication tailored to patient needs to support informed decision (awareness of available options, risks and benefits of treatments) and enable self-care Transparency, honesty, disclosure when something goes wrong	Effective treatment delivered by trusted professionals Timely, tailored and expert management of physical symptoms Attention to physical support needs and environmental needs (e.g. clean, safe, comfortable environment) Coordination and continuity of care; smooth transitions from one setting to another

Table 2 lists search terms of relevance to patient experience derived from Table 1 and from discursive documents in this area of research. [10 15 16 9]

Table 2: Search terms denoting patient experience:
patient-centred care; engagement; communication; clinical interaction; patient-clinician; clinician-patient; patient-doctor; doctor-patient; physician-patient; patient-physician; patient-provider; interpersonal treatment; physician discussion; trust (in physician); patient trust; safety; empathy; compassion; respect; responsiveness; preferences; understanding; shared decision making; participation in decisions; decision making; autonomy; caring; kindness; dignity; honesty; participation; right to decide; integration; trust; time; information; physical comfort; involvement (of family, carers, friends); emotional support; continuity (of care); smooth transition; emotional support; comfort; coordination;

The search of EMBASE using these terms identified 38,294 studies. These were combined with search terms denoting patient safety and effectiveness outcomes obtained from the discursive literature such as 'adherence', 'compliance', 'adverse events' and so on. Some of the searches using these broad terms identified studies returned study numbers far larger than could be analyzed given time constraints so search terms were made more specific (for example, 'adherence to treatment', 'compliance with medicine'.

To manage the scope of this time-limited review, our inclusion criteria focused on studies that measured direct relationships between patients' reporting of their experience and safety and effectiveness outcomes. These included studies measuring associations between experience and outcomes at a patient level (i.e data on both types of variables for the same patients) and associations between aggregated patient measures of experience and outcomes for the same type of organisation such as a hospital or primary care practice. We excluded studies of interventions to improve aspects of relevance to patient experience, although we refer to some of this evidence in the discussion. We prioritized meta-analyses and systematic reviews where available, and used them to summarize evidence in a particular area.

The protocol-driven search identified 5323 papers whose abstracts were then reviewed. If deemed relevant the full article was retrieved to assess whether it met the inclusion criteria.

Given concerns about the sole use of protocol-driven search strategies for complex evidence[17] we applied a second search method using a 'snowballing' approach, starting with references identified in discursive documents [10 15 16] and pursuing references of references, citations and 'related articles' functions in PubMED.

Results

38 articles meeting the inclusion criteria were identified using the protocol-driven approach and 13 using the snowballing approach, with 4 studies common to both. A total of 55 studies met the inclusion criteria.

Table 2 presents evidence in order of patient experience focus, distinguishing between those articles with a broad focus (looking at both 'relational and functional' aspects outlined in Figure 1) and those focusing on a single aspect. Within these categories, studies are then presented in order of breadth of disease focus and then by study design (with systematic reviews presented first).

Overall, the evidence indicates associations between patient experience, safety and effectiveness that appear consistent across a range of disease areas, study designs, settings, population groups and outcome measures.

Chart 1 outlines the disease areas covered.

Chart 1:

Table 3 outlines the range of outcome measures where associations with patient experience and outcomes related to safety and effectiveness were demonstrated.

Table 3: Outcomes related to safety and effectiveness demonstrated

Category	Associations demonstrated	Count
Adherence	Adherence to/compliance with medications and recommended treatment	16
Screening	Cancer screening, Cholesterol screening	8
Symptoms	Symptom burden, discomfort & concern	7
Hospitalization & Length of Stay	Hospitalization, length of stay	6
Doctor visits	Doctor visits, Well-child visits, Preventive visits, Prenatal visits	6
Immunization	Use and timeliness of Immunization services - MMR vaccination, influenza	5
Diabetes care	Diabetes self-management and adherence to recommended care, blood glucose control	5
Self reported health	Self reported health and well-being	4

Function	Functional status, physical function, physical mobility	4
Blood pressure	Blood pressure control, Hypertension control	3
Pain	Pain levels	2
Patient ability	Patient ability to deal with dyspnea, angina	2
Mortality	Inpatient mortality, mortality	2

As shown in detail in Table 4 and synopsized in Table 3, this review found numerous studies showing associations between patients' rating of their experience and adherence to medical treatment and advice, compliance with medication, symptom resolution and self-rated health. There is consistent evidence of better use of preventive services such as cancer screening and immunization. Some studies show an association with physical health outcome measures including blood pressure, blood glucose and mortality.

There is also evidence showing associations between patients' perspective or observations of processes of care and the technical quality and safety of care for the same population group recorded through other means. For example, two large-scale studies of hospitals in the US found patient experience measures associated with technical quality of care for myocardial infarction, congestive heart failure, pneumonia and complications from surgery. [18 19] A similar study in primary care found associations between patient experience and processes of care related to prevention and disease management. [20] Other studies comparing interviews with patients on their experience of individual adverse events with the official reporting of these same events by staff, found underreporting by healthcare providers.[14 21 22]

Table 3 and 4 focus on studies where associations with safety and effectiveness were demonstrated. Not all studies demonstrated associations, but those showing associations between patient experience and the other two domains of quality outweigh those that don't.

Discussion

This reviews shows evidence of associations between patient experience, safety and effectiveness that appear consistent across a range of disease areas, study designs, settings, population groups and outcome measures.

This builds on other studies[9 10 15 16] demonstrating links between these three domains. This study also demonstrates an approach to designing a systematic search for evidence for the 'catch-all' term patient experience, bringing together evidence from a variety of sources that may otherwise remain dispersed. This approach can be used or adapted for further research in this area.

This was a time-limited review and there is scope to expand this search based on our results. There may be scope to broaden the search terms and this may uncover further evidence. The

first search was confined to one database and the review focused primarily on peer-reviewed literature excluding gray literature. The suggested association between measures of patient experience and safety and effectiveness described does not entail causality. As always, there may be a publication bias in favour of studies showing positive associations between patient experience variables and safety and effectiveness outcomes[23] In addition, most studies were conducted in the United States and caution is needed about their applicability to other healthcare systems.

However, the consistent associations between patient experience, safety and effectiveness for a wide range of disease areas, settings, outcome measures and study designs suggest that patient experience is clinically important.

This is supported by further published evidence about interventions to improve aspects of patient experience that did not meet our inclusion criteria. A review of interventions to increase adherence to medication showed communication of information, good provider-patient relationships and patients' agreement with the need for treatment as common determinants of effectiveness. [24] Research on 'decision aids' to ensure patients are well informed about their treatments and that decisions reflect the preferences of patients indicate that patient engagement has a beneficial impact on outcomes. For example, awareness of the risks of surgical procedures resulted in a 23% reduction in surgical interventions and better functional status. [25] Another review showed that provision of good information and emotional support are associated with better recovery from surgery and heart attacks. [26] A systematic review of these interventions to improve patient experience would complement evidence identified in this review.

The data presented supports the view that patient experience data, robustly collected and analysed, may highlight strengths and risks in effectiveness and safety and that focusing on improving patient experience will increase the likelihood of improvements in the other two domains. There are aspects of patient experience that will help to explain performance in safety and effectiveness and vice-versa. The moderate strength of associations in many of the studies also suggests that while experience, safety and effectiveness are linked, they are not interchangeable.

This supports the argument that the three measures should be looked at as a group and not in isolation. Clinicians should resist sidelining patient experience measures as too subjective or mood-orientated, divorced from the 'real' clinical work of measuring safety and effectiveness.

Table 4: Details of individual studies

Author	Patient experience focus	Disease Focus	Type of Study	Setting	Country	Demonstrated safety & Effectiveness outcome
Chang et al. 2006[27]	Relational & functional	22 clinical conditions	Quantitative Observational cohort study 236 patients	Managed care organisations (2)	US	Technical quality of care
Blasi et al. 2001[28]	Relational & functional	Asthma, hypertension, cancer, insomnia, menopause, obesity, tonsilitis	Systematic Review 25 studies	Range of settings	Range	Health status, speed of recovery, pain, adherence to treatment, anxiety,
Sequist et al. 2008[20]	Relational & functional	Cervical cancer, breast cancer, colorectal cancer, chlamydia, cardiovascular conditions, asthma, diabetes	Cross-sectional study (492 settings)	Primary care	US	Cancer screening, Cholesterol screening & control, Asthma medications, Diabetes testing
Burgers et al. 2010[29]	Relational & functional	Chronic lung, mental health problems, hypertension, heart disease, diabetes, arthritis, cancer.	Survey 8973 patients	Range of settings	Range	Morbidity score' combining no.of conditions and health status
Drotar 2009[30]	Relational & functional	asthma, cystic fibrosis, diabetes, epilepsy, inflammatory bowel disease, juvenile rheumatoid arthritis	Systematic review 22 studies	Range of settings	Range	Treatment adherence, office visits, phone calls, hospitalizations, symptoms, emergency room visits, oral steroid burst rates, symptom days, health-related quality of life

Hall et al. 2010[31]	Relational & functional	brain injury, musculoskeletal conditions, cardiac conditions, trauma, back pain, neck and shoulder pain	Systematic review 14 studies	Range of settings	Range	Treatment adherence, therapeutic success, depression, function, global assessment, physical function, floor-bench lifts, activities of daily living
Stevenson et al. 2004[32]	Relational & functional	Hypertension, Chronic Obstructive Pulmonary Disorder, ovarian cancer, epilepsy, hyperlipidaemia	Systematic Review 134 studies	Range of settings	Range	Understanding of treatment, treatment decisions, patients' knowledge of medicines, appointment attendance, number of medicines prescribed
Saultz & Lochner 2005[33]	Relational & functional	Varied	Systematic Review 41 studies	Range of settings	US	Influenza immunization, Timeliness of childhood immunizations + rates, Mammogram rates, PAP Test, Breast examinations, Access to preventive and primary care services, Hospitalization rate, ICU days, Hospital length of stay, Readmission, Adherence to diabetes care, Hypertension control, Neonatal morbidity, Apgar score, Birth weight, Prenatal visits, intervention at delivery, Newborn resuscitation
Kaplan et al 1989[34]	Relational & functional	Ulcer disease, hypertension, diabetes, breast cancer	Randomised control trial 252 patients	Range of settings	US	patient and record reported health status, physiologic measures of health
Jha et al. 2008[18]	Relational & functional	acute myocardial infarction, congestive heart failure, pneumonia complications from surgery.	Cross-sectional study (2429 settings)	Hospital	US	Technical quality of care in AMI, CHF, pneumonia, surgery complications, Ratio of nurses to patient days

Rao et al. 2006[35]	Relational & functional	Hypertension, Influenza	Quantitative Cross sectional study 3487 patients	Primary care	UK	Technical quality of care
Meterko et al. 2010[36]	Relational & functional	Acute myocardial infarction	Quantitative Cohort study 1858 patients	Veteran Affairs Medical Centres	US	Survival 1-year post discharge
Hall & Roter & Katz 1988[37]	Relational & functional	Varied	Meta-analysis 41 studies	Range of settings	Range	recall, compliance
Vincent et al. 1994 [38]	Relational & functional	Varied	Cohort Survey 227 patients	Range of settings	UK	legal action
Agoritsas et al 2005 [39]	Relational & functional	Varied	Cohort patient survey 1518 patients	Hospital	Switzer-land	Adverse events
Flocke et al. 1998 [40]	Relational & functional	Varied	cross-sectional study 2889 patients	Primary care	US	Screening, health habit counseling, use of immunization services
Jackson, J. et al. 2001[41]	Relational & functional	Varied	Quantitative Cohort study 500 patients	Army medical centre	US	Symptom outcome
Jackson, C. et al. 2010[42]	Relational & functional	Inflammatory bowel disease	Systematic review 17 studies	Range of settings	Range	Adherence to treatment

Clark et al. 2007[43]	Relational & functional	Asthma	Randomized control trial 731 patients	Range of settings	US	Office visits for asthma, emergency department visits and urgent office visits, hospitalizations, telephone calls to physicians' offices
Raiz et al. 1999[44]	Relational & functional	Renal transplant	Quantitative Cohort Study 357 patients	Primary care	US	medication compliance
Kahn et al. 2007[45]	Relational & functional	Breast cancer	Prospective cohort study 881 patients	Hospitals	US	adherence
Plomondon et al. 2008[46]	Relational & functional	Myocardial infarction	1815 patients	Hospital	US	Angina
Fuertes et al 2008[47]	Relational & functional	Neurology	Survey 152 patients	hospital	US	Medical treatment adherence, self-efficacy
Lewis et al 2010[48]	Relational & functional	Pain	Qualitative cohort study 191 patients	Primary care	US	Medication adherence
Sans-Coralles et al. 2006[49]	Relational & functional	Range of conditions	Systematic review 20 studies	Primary care	Spain	Preventive activities, pain, vaccinations, blood pressure, hospital days, intensive care days, length of stay, emergency admissions
Safran et al. 1998[15]	Relational & functional	No specific disease focus	Cross-sectional study 7204 patients	Primary care	US	Adherence
Hsiao & Boult 2008[50]	Relational & functional	No specific disease focus	Literature review 14 studies	Primary care	Range	Self-reported health measure

Arbuthnott et al 2009[51]	Relational & functional	No specific disease focus	meta-analysis 48 studies	Range of settings	Canada	Adherence
Stewart 1995[52]	Relational	Peptic ulcers, breast cancer, diabetes, hypertension, headache, coronary artery disease, gingivitis, tuberculosis, prostate cancer,	Systematic Review 21 studies	Range of settings	Range	Anxiety level, psychological distress, health and functional status, blood glucose, blood pressure, headache resolution, blood pressure, glycosylated hemoglobin levels, pain levels, depression, symptom resolution,
Alamo et al. 2002 [53]	Relational	Benign chronic musculoskeletal pain (CMP), fibromyalgia	Experimental clustered randomized study 81 patients	Primary care	Spain	Anxiety, pain, physical mobility, associated symptoms
Fan et al. 2005[54]	Relational	Cardiac care, diabetes, COPD	Survey 21689 patients	Veteran Medical Centres	US	Patient ability to deal with angina, patient education on diabetes, patient ability to deal with dyspnea
O'Malley et al. 2004[55]	Relational	Varied	Cross-sectional study 961 patients	Primary care	US	trust, patient–provider communication, coordination of care
Little et al. 2001[56]	Relational	varied	Survey 865 patients	Primary care	UK	Enablement, symptom burden
Levinson et al. 1997[57]	Relational	Varied	Qualitative cohort study	Primary care	US	Litigation
Carcaise-Edinboro & Bradley 2008[58]	Relational	Colorectal cancer	Cross sectional study 8488 patients	Primary care	US	Colorectal cancer screening
Schneider et al. 2004[59]	Relational	HIV	Cross-sectional analysis study 554 patients	Primary care	US	Medication adherence

Schoenthaler et al. 2008[60]	Relational	Hypertension	Cross-sectional study 439 patients	Primary care	US	Medication adherence
Slatore et al. 2010[61]	Relational	COPD	Cross sectional study 342 patients	Range of settings	US	Breathing problem confidence
Lee & Lin 2009[62]	Relational	Type 2 diabetes	Cohort study 480 patients	Range of settings	Taiwan	Treatment adherence, clinical outcomes from medical records, self-rated health & wellbeing
Heisler et al. 2002[63]	Relational	Diabetes	Survey 1314 patients	primary care	US	Diabetes self-management
Lee & Lin[64]	Relational	Type 2 diabetes	Cohort study 614 patients	Range of settings	Taiwan	No effect demonstrated
Kennedy A. et al. 2003[65]	Relational	Inflammatory bowel Disease	Randomised control trial 700 patients	Hospital	England	Ability to cope with condition, symptom relapses
Stewart et al. 2000[66]	Relational	General	Cohort study 315 patients	Primary care	Canada	Symptom discomfort & concern, Self-reported health (SF36), diagnostic tests, referrals, and visits to the family physician,
Zolnierek & DiMatteo 2009[67]	Relational	No specific disease focus	Meta-analysis 127 studies	Range of settings	Range	Adherence, physician communication
Beck et al 2002[68]	Relational	No specific disease focus	A Systematic Review 22 studies	Primary care	Range	Patient recall, compliance, symptom resolution, health status, quality of life, mortality, anxiety level,

Kinnersley et al. 1999[69]	Relational	No specific disease focus	Mixed methods observational Study (1 setting) 143 patients	Primary care	UK	No effect demonstrated
López et al. 2009[14]	Relational	No specific disease focus	Survey	Hospital	US	Adverse events
Cabana & Jee 2004[70]	Functional	Rheumatoid arthritis, Epilepsy, Breast Cancer, Cervical Cancer, Diabetes	Systematic review 18 studies	Range of settings	US	Use of ambulatory care services, screening services, MMR vaccination, Glucose control - diabetes
Isaac et al. 2010[19]	Functional	Acute myocardial infarction, congestive heart failure, pneumonia complications from surgery.	Cross-sectional study	Hospital	US	Technical quality of care, Medical Patient Safety Indicators (PSIs)- Decubitus Ulcer rates, Infections, Postoperative respiratory failure and postoperative PE or DVT
Glickman et al. 2010[71]	Functional	Acute myocardial infarction	Cohort Study 3562 patients	Hospital	US	Inpatient mortality
Richards et al 2006[72]	Functional	Psoriasis	Review	Range of settings	Range	Adherence
Fremont et al. 2001[73]	Functional	Cardiac	Survey 1346 patients	Hospital	US	Cardiac symptoms + Patient reported general physical and mental health status
Riley et al. 2007[74]	Functional	Cardiac care - acute coronary	Survey 506 patients	Hospital	Canada	cardiac rehabilitation participation, Perceptions of illness consequences
Weingart et al. 2005[21]	Functional	No specific disease focus	Cohort study	Hospital	US	Adverse events

Weissman et al. 2008[22]	Functional	No specific disease focus	Survey	Hospital	US	Adverse events

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PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	n/a
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	4-5
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	5
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	8
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	n/a
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	n/a

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	8
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	n/a
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	12
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	8
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	7-8
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	n/a
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	8
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	n/a
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	5-7
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	7-8
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	8
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	1

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

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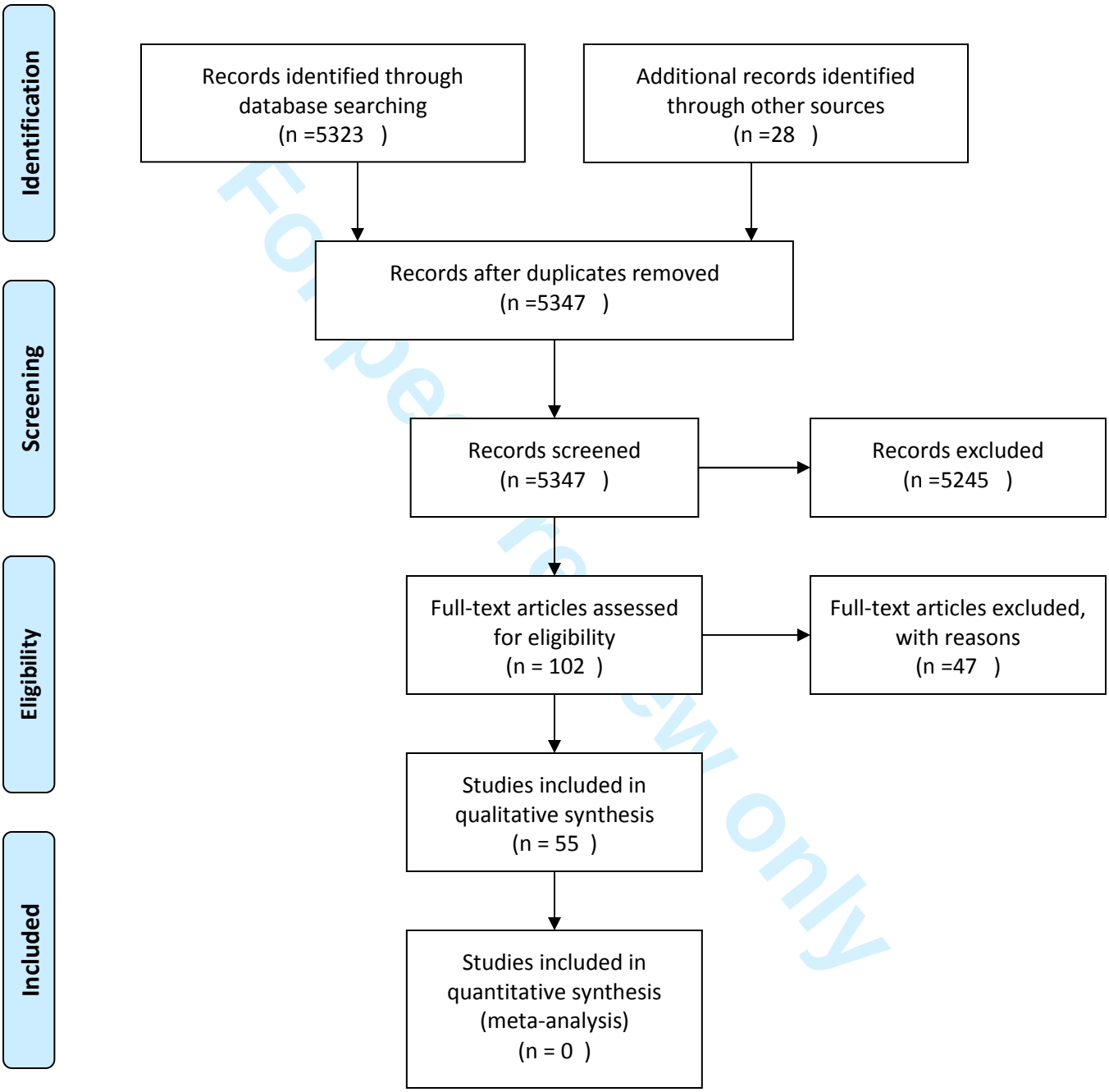
PRISMA Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

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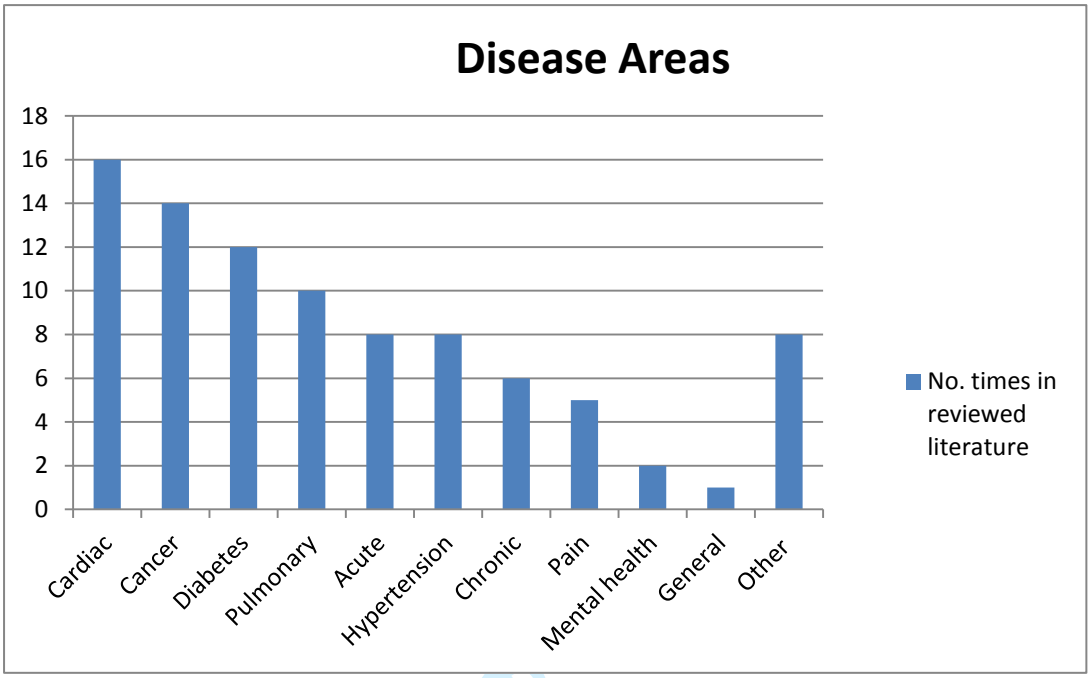
Chart 1: Disease areas covered



BMJ open

A review of evidence on the links between patient experience and clinical safety and effectiveness

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Title	A review of evidence on the links between patient experience and clinical safety and effectiveness
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Keywords:	Health & safety, Quality in healthcare, Health policy, Patient experience, Patient safety
Word Count	2521

Abstract

Objective: To explore evidence on the links between patient experience and clinical safety and effectiveness outcomes.

Design: Systematic review

Setting: A wide range of settings within primary and secondary care including hospitals and primary care centres.

Participants: A wide range of demographic groups and age groups.

Primary and secondary outcome measures: A broad range of safety and effectiveness outcomes including mortality, physical symptoms, length of stay and adherence to treatment.

Results: 55 articles met the inclusion criteria for this review. The evidence indicates consistent associations between patient experience, safety and effectiveness for a wide range of disease areas, settings, outcome measures and study designs. Evidence demonstrates associations between patient experience and self-rated and objectively measured health outcomes; adherence to recommended clinical practice and medication); preventive care (such as health-promoting behavior, use of screening services and immunization; and resource use (such as hospitalization, length of stay and primary care visits). There is some evidence of associations between patient experience and measures of the technical quality of care and adverse events. While some areas would benefit from further research, overall the count of associations found outweigh those not found.

Conclusion: The data presented shows associations between patient experience and clinical effectiveness and safety and supports the case for the inclusion of patient experience as one of the central pillars of quality in health care. It suggests that improvement of patient experience will increase the likelihood of improvements in the other two domains and supports the argument that the three measures should be looked at as a group and not in isolation. Clinicians should resist sidelining patient experience measures as too subjective or mood-orientated, divorced from the 'real' clinical work of measuring safety and effectiveness.

Trial registration: This review was not registered.

Article Summary

Article focus:

- Should patient experience, as advocated by the Institute of Medicine and the NHS Outcomes Framework, be seen as one of the pillars of quality in health care alongside clinical safety and effectiveness?
- What aspects of patient experience can be linked to health and safety outcomes?
- What evidence is available on the links between patient experience and clinical safety and effectiveness outcomes?

Key Messages:

- The results show that patient experience is consistently associated with patient safety and clinical effectiveness across a wide range of disease areas, study designs, settings, population groups and outcome measures.
- Patient experience is associated with: self-rated and objectively measured health outcomes; adherence to recommended medication and treatments; preventive care such as use of screening services and immunizations; healthcare resource use such as hospitalization and primary care visits; the technical quality of care delivery and adverse events
- Improvement to patient experience may increase the likelihood of improvements in clinical outcomes and patient safety.

Strengths and limitations of this study:

- This study demonstrates an approach to designing a systematic review for the 'catch-all' term patient experience, and brings together evidence from a variety of sources that may otherwise remain dispersed.
- This was a time-limited review and there is scope to expand this search based on the results and broaden the search terms to uncover further evidence.

Introduction

Patient experience is increasingly recognized as one of three pillars of quality in healthcare alongside safety and clinical effectiveness. [1] In the NHS the measurement of patient experience data to identify strengths and weaknesses of health care delivery, drive quality improvement, inform commissioning and promote patient choice is now mandatory.[2 3 4] In addition to data on harm avoidance or success rates for treatments, providers are now assessed on aspects of care such as dignity and respect, compassion and involvement in care decisions. [4] In England these data are published in Quality Accounts and the Commissioning for Quality & Innovation (CQUINs) payment framework makes a proportion of care providers' income conditional on improvement in this domain. [5]

The inclusion of patient experience as a pillar of quality is often justified on the grounds of its intrinsic value – that the expectation of humane, empathic care is a given and requires no further justification. It is also justified on more utilitarian grounds as a means of improving safety and effectiveness. [6 7] For example, clear information, empathic, two-way communication and respect for patients' beliefs and concerns could lead to patients being more informed and involved in decision making and create an environment where patients are more willing to disclose information. Patients could have more 'ownership' of clinical decisions, entering a 'therapeutic alliance' with clinicians. This could support improved and more timely diagnosis, clinical decisions and advice and lead to fewer unnecessary referrals or diagnostic tests.[8 9] Increased patient agency can encourage greater participation in personal care and compliance with medication, adherence to recommended treatment, monitoring of prescriptions and dose.[10 9] Patients can be informed about what to expect from treatment and be motivated to report adverse events or complications and keep a list of their medical histories, allergies, and current medications. [11]

Patients' direct experience of care process through clinical encounters or as an observer (for example, as a patient on a hospital ward) can provide valuable insights into everyday care. Examples include attention to pain control, assistance with bathing or help with feeding, or the environment (cleanliness, noise, physical safety) or coordination of care between professions or organizations. Given the organizational fragmentation of much healthcare care and the numerous services with which many patients interact, the measurement of patient experience may help provide a 'whole system' perspective not readily available from more discrete safety and effectiveness measures.[11]

Focusing on such utilitarian arguments, this study reviews evidence on links that have been demonstrated between patient experience and safety and effectiveness.

Methods

Identifying variables relevant to patient experience

Patient experience is a term that encapsulates a number of dimensions and in preliminary database searches this phrase on its own uncovered a limited number of studies. To broaden and structure the search for evidence, identify search terms and provide a framework for analysis it was necessary to identify what patient experience entails and outline potential pathways through which it is proposed to impact on safety and effectiveness. As such, we combined common elements from patient experience frameworks produced by The Institute of Medicine[1], Picker Institute[12] and NICE [13].

Table 1 delineates different dimensions of patient experience and distinguishes between 'relational' and 'functional' aspects. Relational aspects refer to interpersonal aspects of care – the ability of clinicians to empathise, respect the preferences of patients, include them in decision making and

provide information to enable self-care.[10] It also refers to patients' expectations that professionals will put their interest above other considerations and be honest and transparent when something goes wrong. [8 14] Functional aspects relate to basic expectations about how care is delivered, such as attention to physical needs, timeliness of care, clean and safe environments, effective coordination between professionals and continuity.

Table 1: Identifying aspects of patient experience and search terms

Relational aspects	Functional aspects
Emotional and psychological support, relieving fear and anxiety, treated with respect, kindness, dignity, compassion, understanding Participation of patient in decisions and respect and understanding for beliefs, values, concerns, preferences and their understanding of their condition Involvement of, and support for family and carers in decisions Clear, comprehensible information and communication tailored to patient needs to support informed decision (awareness of available options, risks and benefits of treatments) and enable self-care Transparency, honesty, disclosure when something goes wrong	Effective treatment delivered by trusted professionals Timely, tailored and expert management of physical symptoms Attention to physical support needs and environmental needs (e.g. clean, safe, comfortable environment) Coordination and continuity of care; smooth transitions from one setting to another

Using these frameworks and discursive documents in this area of research [10 15 16 9] as a guide we identified words and phrases commonly used to denote aspects of patient experience, examples of which are listed in Table 2.

Table 2: Search terms denoting patient experience:
patient-centred care; patient engagement; clinical interaction; patient-clinician; clinician-patient; patient-doctor; doctor-patient; physician-patient; patient-physician; patient-provider; interpersonal treatment; physician discussion; trust in physician; empathy; compassion; respect; responsiveness; patient preferences; shared decision making; therapeutic alliance; participation in decisions; decision making; autonomy; caring; kindness; dignity; honesty; participation; right to decide; physical comfort; involvement (of family, carers, friends); emotional support; continuity (of care); smooth transition; emotional support;

These were combined with search terms representing patient safety and effectiveness outcomes hypothesized to be associated with patient experience in discursive literature. We searched for a broad range of outcome measures, including both self-rated and 'objective' measurements of health status, physical and mental health and wellbeing, the use of preventive health services, compliance or adherence to health-promoting behavior and resource use.

Combining these two sets of search terms in the EMBASE database, we identified 5323 papers whose abstracts were then reviewed. If deemed relevant the full article was retrieved to assess whether it met the inclusion criteria.

Given concerns about the sole use of protocol-driven search strategies for complex evidence[17] we combined this search with a 'snowballing' method, pursuing references of references, citations and 'related articles' functions in PubMED for those articles identified in the initial search.

Inclusion criteria, assessment of quality and categorisation of evidence

We included studies that measured associations between patients' reporting of their experience and safety and effectiveness outcomes. These included studies measuring associations between experience and outcomes at either at a patient level (i.e data on both types of variables for the same patients) or at an organizational level (i.e. associations between aggregated patient measures of experience and outcomes for the same type of organisation such as a hospital or primary care practice). (TEXT REMOVED …We excluded studies of interventions to improve aspects of relevance to patient experience, although we refer to some of this evidence in the discussion).

We included studies where the variables denoting both patient experience and safety and effectiveness were measured in a credible way, through the use of validated tools. For patient experience variables these include surveys covering several aspects of experience (such as Picker Surveys and the Hospital Consumer Assessment of Healthcare Providers and Systems survey) and specific aspects (such as a 'Working Alliance Scale'[18] , Multidimensional Health Locus of Control Scale (MHLC) scale[19] or usual provider continuity (UPC) index[20]). For safety and effectiveness these include, for example, generic health and quality of life surveys (such as Short-Form 36 (SF36)), disease-specific surveys (such as the Seattle Angina Questionnaire[21]) measures of the technical quality of care (such as the Hospital Quality Alliance (HQA) score, reviews of medical records and care provider data. [22] Details of the methods used to measure both variables in each study are included in Tables 6 and 7.)

We included studies where the sample size of patients or organizations appeared sufficiently large to conduct meaningful statistical analysis (excluding studies with fewer than 50 subjects) and took account of differences in perspectives between demographic groups. When extracting data relevant to our study from systematic reviews we selected only those studies that met these criteria.

We then counted both associations found and not found for each study. Associations refer to cases where one measure of patient experience (typically an overall rating of patient experience for a care provider) has a statistically significant association with one or more effectiveness or safety variable. If a study showed associations between several aspects of patient experience that appeared to be closely related (for example, 'listening', 'empathy', or 'respect') and an aspect of effectiveness or safety, this was counted as one association found. This was to avoid exaggerating the weight of the evidence by 'over counting' associations.

Two main types of studies emerged in the search – those focusing on interventions to improve aspects of patient experience and those exploring associations between patient experience variables and safety and effectiveness variables. To manage the scope of this time-limited review we decided to restrict analysis of the large number of interventions to the evidence contained within systematic reviews.

(TEXT REMOVED) Table 2 presents evidence in order of patient experience focus, distinguishing between those articles with a broad focus (looking at both 'relational and functional' aspects outlined in Figure 1) and those focusing on a single aspect. Within these categories, studies are then presented in order of breadth of disease focus and then by study design (with systematic reviews presented first).

Overall, the evidence indicates associations between patient experience and safety and effectiveness that appear consistent across a range of disease areas, study designs, settings, population groups and outcome measures. Associations found outweigh those not found by 429 to 127. Of the four studies where evidence against associations outweigh evidence for associations there is no suggestion that these are methodologically superior.

Table 3 shows surveys to be the predominant method used to measure variables for individual studies.

Table 3: Methods used to measure variables

	No of studies
Patient experience variables	
Survey	31
Interviews	2
Medical records	1
Effectiveness & safety variables	
Survey for self-rated healthcare	12
Other survey	14
Medical records	3
Data monitoring quality of care delivery (e.g. audit, HQA, HEDIS)	3
Care provider outcome data	3
Physical examination	1
Patient interviews	2

Chart 1 outlines the disease areas covered. **(Chart 1 inserted here)**

Table 4 presents the frequency of associations categorized by type of outcomes (where a description was available). These include; objectively measured health outcomes (for example, 'mortality', 'blood glucose levels', 'infections', 'medical errors'); self-reported health and wellbeing outcomes (for example, 'health status', 'functional ability' 'quality of life', 'anxiety'); adherence to recommended treatment and use of of preventive care services likely to improve health outcomes (for examples, 'medication compliance', 'adherence to treatment' and screening for a variety of conditions); outcomes related to healthcare resource use (for example 'hospitalizations', 'hospital readmission', 'emergency department use', 'primary care visits'); errors or adverse events and measures of the technical quality of care.

Table 4: Associations categorised by type of outcome

	Objective' health outcomes	Self-reported health and wellbeing	Adherence to treatment (including medication)	Preventive care	Healthcare resource use	Adverse events	Technical quality of care	All categories
No. of associations found	29	61	152	24	31	7	8	312
No. of associations not found	11	36	7	2	6	0	4	66

Table 5 shows associations categorised by type of care provider and for chronic conditions.

Table 5: Weight of evidence by provider and for chronic conditions	Associations found	Associations not found
Primary care	110	48
Hospital	43	17
Chronic conditions	53	9

Tables 6 and 7 present details of all studies identified, specifying the analytical focus of each study, methods to measure variables and associations found.

(TEXT AND PREVIOUS TABLE 3 REMOVED ?Table 3 outlines the range of outcome measures where associations with patient experience and outcomes related to safety and effectiveness were demonstrated.)

Table 3: Outcomes related to safety and effectiveness demonstrated

Category	**Associations demonstrated**	**Count**
Adherence	Adherence to/compliance with medications and recommended treatment	16

Screening	Cancer screening, Cholesterol screening	8
Symptoms	Symptom burden, discomfort & concern	7
Hospitalization & Length of Stay	Hospitalization, length of stay	6
Doctor visits	Doctor visits, Well-child visits, Preventive visits, Prenatal visits	6
Immunization	Use and timeliness of Immunization services - MMR vaccination, influenza	5
Diabetes care	Diabetes self-management and adherence to recommended care, blood glucose control	5
Self reported health	Self reported health and well-being	4
Function	Functional status, physical function, physical mobility	4
Blood pressure	Blood pressure control, Hypertension control	3
Pain	Pain levels	2
Patient ability	Patient ability to deal with dyspnea, angina	2
Mortality	Inpatient mortality, mortality	2

(TEXT REMOVED – REPLACED WITH MORE DETAILED DISCUSSION BELOW) This review found numerous studies showing associations between patients' rating of their experience and adherence to medical treatment and advice, compliance with medication, symptom resolution and self-rated health. There is consistent evidence of better use of preventive services such as cancer screening and immunization. Some studies show an association with physical health outcome measures including blood pressure, blood glucose and mortality.

There is also evidence showing associations between patients' perspective or observations of processes of care and the technical quality and safety of care for the same population group recorded through other means. For example, two large-scale studies of hospitals in the US found patient experience measures associated with technical quality of care for myocardial infarction, congestive heart failure, pneumonia and complications from surgery. A similar study in primary care found associations between patient experience and processes of care related to prevention and disease management. Other studies comparing interviews with patients on their experience of individual adverse events with the official reporting of these same events by staff, found underreporting by healthcare providers.

Table 3 and 4 focus on studies where associations with safety and effectiveness were demonstrated. Not all studies demonstrated associations, but those showing associations between patient experience and the other two domains of quality outweigh those that don't.)

Discussion

Overall, the evidence indicates associations between patient experience, safety and effectiveness that appears consistent across a range of disease areas, study designs and settings.

As Table 4 indicates, the evidence shows associations found outweigh those not found for both self-assessment of physical and mental health (61 vs 36) and 'objective' measures of health outcomes (e.g. where measures are taken by a clinician or by reviewing medical records) (29 vs 11). For objective measures, one study [23] shows associations for ulcer disease, hypertension and breast cancer. Two studies on myocardial infarction show associations with survival one year after discharge [24] and inpatient mortality. [25] Objective measurement is less frequently explored than self-rated health and is an area that could benefit from further research.

Evidence is strong in the case of adherence to recommended medical treatment. A meta-analysis included in this study showed associations between the quality of patient communications and adherence to medical treatment in 125 out of 127 studies analysed and showed the odds of patient adherence 1.62 times higher for physicians with communication training compared to those without.[26] Regarding compliance with medication, associations found outweigh those not found. [19 27-33] A review of interventions to increase adherence to medication (not included in this study) showed communication of information, good provider-patient relationships and patients' agreement with the need for treatment as common determinants of effectiveness. [34] There is evidence of better use of preventive services, such as screening services in diabetes, colorectal, breast and cervical cancer; cholesterol testing and immunization. [23 35-38] There is also evidence of impacts on resource use of primary and secondary care (such as hospitalizations, readmissions and primary care visits). [20 27 39-44]

For studies exploring associations between patient experience and technical quality of care measured by other means the evidence is mixed. Two studies in acute care (ADD REFS) showed associations between overall ratings of patient experience and ratings of the technical quality of care (using Hospital Quality Alliance (HQA) measures) for myocardial infarction, congestive heart failure, pneumonia and complications from surgery. [22 45] Another found an association with adherence to clinical guidelines for acute myocardial infarction.[25] A similar study in primary care found associations between patient experience of processes and measurement of care quality (from the HEDIS system measuring care quality for disease prevention and management in chronic conditions). [35] However, two other studies found no associations between patients' ratings and ratings based on an assessment of medical records.[46 47]

There is evidence showing associations between patients' perspective or observations of processes of care and the safety of care recorded through other means. Isaac (add ref) found associations between ratings of patient experience and six patient safety indicators (decubitus ulcer; failure to rescue; infections due to medical care; postoperative hemorrhage, respiratory failure, pulmonary embolism and sepsis). Two studies, examining evidence for patients' ability to identify medical errors or adverse events in hospital, showed associations between patients' accounts of their experience of adverse events and the documentation of events in medical records.[48 49] But another s study shows only 2% of patient-reported errors were classified by medical reviewers as 'real clinical medical errors' with most 'reclassified' by clinicians as 'misunderstandings' or 'behaviour or communication problems'.[50] Overall there is less evidence available on safety compared to effectiveness and this should be a priority for future research in this area.

Research from other studies not included in this review support these findings. For example, research on 'decision aids' to ensure patients are well informed about their treatments and that decisions reflect the preferences of patients indicate that patient engagement has a beneficial impact on outcomes. For example, awareness of the risks of surgical procedures resulted in a 23% reduction in surgical interventions and better functional status. [51] Another review showed that provision of good information and emotional support are associated with better recovery from surgery and heart attacks. [52]

Study strengths and limitations

This review builds on other studies[9 10 15 16] demonstrating links between these three domains. This study also demonstrates an approach to designing a systematic search for evidence for the 'catch-all' term patient experience, bringing together evidence from a variety of sources that may otherwise remain dispersed. This approach can be used or adapted for further research in this area.

This was a time-limited review and there is scope to expand this search based on our results. There may be scope to broaden the search terms and this may uncover further evidence. The first search was confined to one database and the review focused primarily on peer-reviewed literature excluding gray literature. To manage the scope of this review we decided to restrict the analysis of interventions to improve patient experience to evidence within systematic reviews. The suggested association between measures of patient experience and safety and effectiveness described does not entail causality. Although all associations included in the study are statistically significant, the strength of associations vary. Due to time constraints and the heterogeneity of measures used we did not systematically compare the strengths of associations in different studies but this may be an area for future work. As always, there may be a publication bias in favour of studies showing positive associations between patient experience variables and safety and effectiveness outcomes[53] In addition, most studies were conducted in the United States and caution is needed about their applicability to other healthcare systems.

Although there are areas that would benefit from further research, the data presented supports the view that patient experience data, robustly collected and analysed, may highlight strengths and risks in effectiveness and safety and that focusing on improving patient experience will increase the likelihood of improvements in the other two domains. There are aspects of patient experience that will help to explain performance in safety and effectiveness and vice-versa.

Conclusion

The evidence suggests that attention to these various dimensions of patient-centred care outlined in Table 1 may result in important clinical benefits and more effective use of health care resources, particularly for chronic conditions, where most healthcare resources are consumed. There is also some evidence to suggest that patients can be used as partners in identifying poor and unsafe practice and help enhance quality and safety.

This supports the argument that the three measures should be looked at as a group and not in isolation. Clinicians should resist sidelining patient experience measures as too subjective or mood-orientated, divorced from the 'real' clinical work of measuring and delivering safety and effectiveness.

Table 6: Individual studies

Author	Type of study, sample size, country	Setting	Disease focus	Unit of analysis (Patient (P) or org (O)	Patient experience focus and method used -	Safety & effectiveness measure -	Association demonstrated	Association NOT demonstrated	Assoc. Found vs NOT found
Chang et al. 2006[47]	Cohort study, 236 patients, US	Managed care organisation	22 clinical conditions	P	Providers communication (The Consumer Assessment of Healthcare Providers and Systems survey and 'Quality of care')	Technical quality and patient global ratings (Medical records and patient interviews)	None	Technical quality of care	0/1
Sequist et al. 2008[35]	Cross-sectional study, 492 settings, US	Primary care	Cervical, breast and colorectal cancer, chlamydia, cardiovascular conditions, asthma, diabetes	P	Doctor-patient communication, clinical team interactions, organizational features of care (The Ambulatory Care Experiences Survey)	Clinical quality focusing on disease prevention, disease management and outcomes of care (Healthcare Effectiveness Data and Information Set (HEDIS))	Cervical cancer, breast cancer and colorectal cancer screening, Chlamydia screening, Cholesterol screening (cardiac), LDL cholesterol testing (diabetes), eye exams (diabetes), HbA1c testing, nephropathy screening	Cholesterol management, HbA1c control, LDL cholesterol control, blood pressure control	9/4
Burgers et al. 2010[54]	Survey, 8973 patients, Range	Range of settings	Chronic lung, mental health, hypertension, heart disease, diabetes, arthritis, cancer.	P	Coordination of care and overall experience (Commonwealth Fund International Health Policy Survey)	Morbidity score	Morbidity score	None	1/0
Kaplan et al. 1989 [23]	Randomised control trial, 252 patients, US	Range of settings	Ulcer disease, hypertension, diabetes, breast cancer	P	Physician-patient communication (Assessment of audio tape and questionnaire)	Physiologic measures taken at visit and patients' self-rated health status survey.	Follow up blood glucose and blood pressure, functional health status, self reported health status.	None	4/0
Jha et al. 2008 [22]	Cross-sectional study, 2429 settings, US	Hospital	Acute myocardial infarction, congestive heart failure, pneumonia complications from surgery.	O	Patient communication with clinicians, expereince of nursing services, discharge planning (Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey)	Technical quality of care using Hospital Quality Alliance (HQA) score	Technical quality of care in AMI, CHF, pneumonia, surgical care	None	4/0

Rao et al. 2006 [46]	Cross sectional study, 3487 patients, UK	Primary care	Hypertension, Influenza vaccination	P	Older patients' experience of technical quality of care (General Practice Assessment survey)	Technical quality of care - (medical records)	None	Hypertension monitoring and control, influenza vaccination.	0/3
Meterko et al. 2010 [24]	Cohort study, 1858 patients, US	Veteran Affairs Medical Centres	Acute myocardial infarction	P	Patient-centred care, access, courtesy, information, coordination, patient preferences, emotional support, family involvement, physical comfort (VA Survey of Healthcare Experiences of Patients (SHEP))	Survival 1-year postdischarge	Survival 1-year postdischarge	None	1/0
Vincent et al. 1994 [55]	Cohort Survey 227 patients, UK	Range of settings	Varied	P	Accountability, explanation, standards of care, compensation (Questionnaire)	Legal action	Legal action	None	1/0
Agoritsas et al. 2005 [56]	Cohort patient survey, 1518 patients, Switzerland	Hospital	Varied	P	Global rating of care and respect and dignity questions (Picker survey)	Patient reports of undesirable events (survey)	Neglect of important information by health care staff, pain control, needless repetition of a test, being handled with roughness	None	4/0
Flocke et al. 1998 [36]	Cross-sectional study, 2889 patients, US	Primary care	Varied	P	Interpersonal communication, physician's knowledge of patient, coordination (Components of Primary Care Instrument (CPCI))	Use of preventive care services (screening, health habit counseling services, immunization services)	Screening, health habit counselling, immunization	None	3/0
Jackson, J. et al. 2001 [57]	Quantitative Cohort study 500 patients, US	General medicine walk-in clinic	Varied	P	Patient satisfaction (RAND 9-item survey)	Functional status (Medical Outcomes Study Short-Form Health Survey [SF-6]), symptom resolution, (RAND 9-item survey), follow-up visits	Symptom resolution, repeat visits, functional status	None	3/0

Clark et al. 2007 [40]	Randomized control trial 731 patients, US	Range of settings	Asthma	P	Patient experience of physician communication (Patient interviews and Lickert Scale)	Emergency department visits, hospitalizations, office phone calls and visits, urgent office visits (Survey + Medical chart review of 6% of patients to verify responses.)	Number of office visits, emergency visits, urgent office visits, phone calls, hospitalizations	None	5/0
Raiz et al. 1999 [19]	Quantitative Cohort Study, 357 patients, US	Primary care	Renal transplant	P	Patient faith in doctor (Multidimensional Health Locus of Control Scale (MHLC))	Medication compliance	Remembering medications, taking medications as prescribed	None	2/0
Kahn et al. 2007 [30]	Cohort study, 881 patients, US	Hospitals	Breast cancer	P	Level of physician support, participation in decision-making and information on side effects (Survey)	Medication adherence	Ongoing tamoxifen use	None	1/0
Plomondon et al. 2008 [21]	Cohort study, 1815 patients, US	Hospital	Myocardial infarction	P	Satisfaction with explanations from their doctor, overall satisfaction with treatment (Seattle Angina questionnaire)	Presence of angina (Seattle Angina Questionnaire)	Presence of angina	None	1/0
Fuertes et al. 2008 [18]	Survey, 152 patients, US	Hospital	Neurology	P	Physician–patient communication, Physician–Patient Working Alliance, Empathy, Multicultural Competence (Questionnaire)	Adherence to medical treatment (Adherence Self-Efficacy Scale and Medical Outcome Study (MOS) Adherence Scale).	Adherence to treatment	None	1/0
Lewis et al. 2010 [29]	Qualitative cohort study, 191 patients, US	Primary care	Pain	P	Doctor–Patient Communication (Survey)	Medication adherence (Prescription Drug Use Questionnaire (PDUQ))	Use of Prescribed Opioid Medications	None	1/0

Safran et al. 1998 [58]	Cross-sectional study, 7204 patients, US	Primary care	Varied	P	Accessibility, continuity, integration, clinical interaction, interpersonal aspects, trust (The Primary Care Assessment Survey)	Adherence to physician's advice, health status, health outcomes (Medical Outcomes Study (MOS), Behavioral Risk Factor Survey.)	Adherence, health status	Health outcomes	2/1
Alamo et al. 2002 [59]	Randomized study, 81, Spain	Primary care	Chronic musculoskeletal pain (CMP), fibromyalgia	P	Patient centered-care ('Gatha-Res questionnaire' and follow-up phone call)	Pain (Visual Analogue Scale (VAS) anxiety (Oldberg scale of anxiety and depression (GHQ))	Anxiety, number of tender points (pain)	Pain, pain intensity, pain as a problem, number of associated symptoms, depression, physical mobility, social isolation, emotional reaction, sleep	2/10
Fan et al. 2005 [60]	Survey, 21689 patients, US	Primary care	Cardiac care, diabetes, COPD	P	Communication skills and humanistic qualities of primary care physician (Seattle Outpatient Satisfaction Survey)	Physical and emotional aspects, coping ability and symptom burden for angina, COPD and diabetes (Seattle Angina Questionnaire (SAQ), Obstructive Lung Disease Questionnaire (SOLDQ), Diabetes Questionnaire (SDQ))	Patient ability to deal with all 3 diseases, education for diabetes patients, angina stability, physical limitation due to angina	Self-reported physical limitation for angina and COPD, symptom burden for diabetes, complications for diabetes	7/4
O'Malley et al. 2004 [37]	Cross-sectional study, 961 patients, US	Primary care	Varied	P	Patient trust (Survey)	Use of preventive care services	Blood pressure measurement , height and weight measurement, cholesterol check, pap tests, breast cancer screening, colorectal cancer screening, discussion of diet, discussion on depression	None	8/0
Little et al. 2001 [61]	Survey, 865 patients, UK	Primary care	varied	P	Patient centredness (Survey)	Enablement, symptom burden, resource use	Enablement, symptom burden, referrals	Reattendance, investigations	3/2

Levinson et al. 1997 [62]	Qualitative cohort study, 124 physicians, US	Primary care	Varied	P	Physician-patient communication (Assessment of audiotape)	Malpractice	Malpractice claims	None	1/0
Carcaise-Edinboro & Bradley 2008 [38]	Cross sectional study, 8488 patients, US	Primary care	Colorectal cancer	P	Patient-provider communication (Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey)	Colorectal Cancer screening, fecal occult blood testing, and colonoscopy (Medical Expenditure Panel Survey)	CRC screening, fecal occult blood testing, colonoscopy	None	3/0
Schneider et al. 2004 [31]	Cross-sectional analysis study, 554 patients, US	Primary care	HIV	P	Physician-patient relationship (Survey)	Adherence (Survey)	Adherence to antiretroviral therapy	None	1/0
Schoenthaler et al. 2008 [32]	Cross-sectional study, 439 patients, US	Primary care	Hypertension	P	Patients' perceptions of providers' communication (Survey)	Medication adherence (Morisky self-report measure)	Medication adherence	None	1/0
Slatore et al. 2010 [63]	Cross sectional study, 342 patients, US	Range of settings	COPD	P	Patient-clinician communication (Quality of communication questionnaire (QOC))	Self-reported breathing problem confidence, and general self-rated health (Survey)	Confidence in dealing with breathing problems	Self-rated health	1/1
Lee & Lin 2009 [64]	Cohort study, 480 patients, Taiwan	Range of settings	Type 2 diabetes	P	Trust in physicians (Survey)	Self-eficacy, adherence, health outcomes (Multidimensional Diabetes Questionnaire and 12-Item Short-Form Health Survey (SF-12))	Physical HRQoL, mental HRQoL, body mass index HbA1c, triglycerides, complications, self-efficacy, outcome expectations, adherence	None	9/0
Heisler et al. 2002 [33]	Survey, 1314 patients, US	primary care	Diabetes	P	Physician communication, physician interaction styles, participatory decision making (Questionnaire)	Disease management (Surveys and national databases)	Overall self-management, diabetes diet, medication compliance, exercise, blood glucose monitoring, foot care.	Exercise	6/1

Lee & Lin 2010 [65]	Cohort study, 614 patients, Taiwan	Range of settings	Type 2 diabetes	P	Patients' perceptions of support, autonomy, trust, satisfaction (Health Care Climate Questionnaire and Autonomy Preference Index (API))	Glycosylated hemoglobin (HbA1C) (medical records) Physical and mental health-related qality of life (HRQoL) (SF-12)	Physical HRQoL, mental HRQoL	Information preference interaction, HbA1C	2/2
Kennedy A. et al. 2003 [66]	Randomised control trial, 700 patients, UK	Hospital	Inflammatory bowel Disease	P	Patient centered-care (Interviews)	Resource use, self-rated physical and mental health, enablement (Patient diaries, questionnaires, medical records)	Ability to cope with condition, symptom relapses, hospital visits, appointments made	Physical functioning, role limitations, social functioning, mental health, energy/vitality, pain, general health perception, anxiety, number of relapses, number of medically-defined relapses, average relapse duration, frequency of GP visits, delay before starting treatment	4/13
Stewart et al. 2000 [41]	Observational Cohort study, 315 patients, Canada	Primary care	General	P	Patient-centred communication (Assessment of audiotape and Patient-Centered Communication Score tool)	Discomfort (VAS) symptom severity severity (Visual Analogue Scale), Health Status (Short Form-36 SF-36) Quality of care provision (Chart review by doctors)	Symptom discomfort & concern, self-reported health, diagnostic tests, referrals, and visits to the family physician	None	5/2
Kinnersley et al. 1999 [67]	Observational Study, 143 patients, UK	Primary care	Varied	P	Patient-centredness (Assessment of audiotape and questionnaires)	Symptom resolution, resolution of concerns, functional health status (Questionnaire)	None	Resolution of symptoms, resolution of concerns, functional health status	0/3

Solberg et al. 2008 [50]	Survey, 3109 patients, US	Primary care - multispecialty group	Varied	P	Patient experience of errors (Survey)	Review of errors (Chart audits and physician reviewer judgements)	None	None	1/0
Isaac et al. 2010 [45]	Cross-sectional study, 927 hospitals, US	Hospital	Acute myocardial infarction, congestive heart failure, pneumonia complications from surgery.	O	General patient experiences (Hospital Consumer Assessment of Healthcare Providers and Systems survey (HCAHPS))	Processes of care (Health Quality Alliance (HQA) database) and Patient Safety Indicators	Decubitus ulcer rates, infections, processes of care for pneumonia, CHF and myocardial infarctions, surgical composites, hemorrage, respiratory failure, DVT, pulmonary embolism, sepsis	Failure to rescue	11/1
Glickman et al. 2010 [25]	Cohort Study, 3562 patients, US	Hospital	Acute myocardial infarction	P	Patient satisfaction (Press-Ganey survey)	Adherence to practice guidelines, outcomes (CRUSADE quality improvement registry).	Inpatient mortality, composite clinical measures, AMI survival	None	3/0
Fremont et al. 2001 [68]	Survey, 1346 patients, US	Hospital	Cardiac	P	Patient centred care (Picker survey)	Processes of care, functional health status, cardiac symptoms (Medical Outcomes Study questionnaire, London School of Hygiene measures for cardiac symptoms)	Overall health, chest pain, patient reported general physical and mental health status	Mental health, shortness of breath	5/2
Riley et al. 2007 [69]	Survey, 506 patients, Canada	Hospital	Cardiac care - acute coronary	P	Continuity of care (The Heart Continuity of Care Questionnaire, Medical Outcome Study Social Support Survey, Illness Perception Questionnaire)	Participation in cardiac rehabilitation, perception of illness, functional capacity (Duke Activity Status Index (DASI))	Cardiac rehabilitation participation, perceptions of illness consequences	None	2/0
Weingart et al. 2005 [48]	Cohort study, 228 patients, US	Hospital	Varied	P	Patient experience of adverse events (Interviews)	Adverse events (Medical records and patient interviews)	Adverse events	None	1/0
Weissman et al. 2008 [49]	Survey, 998 patients, US	Hospital	Varied	P	Patient experience of adverse events (Interviews)	Adverse events (Medical records)	Adverse events	None	1/0

Table 7: Systematic reviews

Authors	Timespan & studies meeting inclusion criteria	Health care setting	Disease areas covered	Unit of analysis	Patient experience focus (and measurement methods)	Safety & effectiveness measure - association demonstrated -	Safety & effectiveness measure - association NOT demonstrated	Assocs found vs not found
Blasi et al. 2001 [70]	1974-1998, 4 out of 25	Range of settings	Asthma, hypertension, cancer, insomnia, menopause, obesity, tonsilitis	P	Provider behaviour and communication (Grading of consultations)	Health status, symptom improvement, treatment effectiveness, fear of injection, anxiety, ratings of pain, number of doctor visits, pain, speed of recovery	Comfort, recovery time, return visits	9/3
Drotar 2009 [27]	1998-2008, 4 out of 22	Range of settings	Asthma, cystic fibrosis, diabetes, epilepsy, inflammatory bowel disease, juvenile rheumatoid arthritis	P	Physician and staff behavior (Surveys, interviews, medical records)	Treatment adherence, compliance, office visits, phone calls, hospitalizations	Medication adherence	5/1
Hall et al. 2010 [71]	1990-2009, 10 out of 14	Range of settings	Brain injury, musculoskeletal conditions, cardiac conditions, trauma, back, neck and shoulder pain	P	Therapist-patient relationship, therapeutic alliance (Surveys, audio/video taped session)	Adherence, employment status, physical training, therapeutic success, perceived effect of treatment, pain, physical function, depression, general health status, attendance, floor-bench lifts, global assessment scores, ability to perform ADLs, mobility	Weekly physical training, disability, productivity, depression, functional status, adherence	18/6
Stevenson et al. 2004 [72]	1991-2000, 7 out of 134	Range of settings	Hypertension, asthma, chronic obstructive pulmonary disorder, ovarian cancer, epilepsy, hyperlipidaemia	P	Doctor-patient communication (Surveys)	Self-reported adherence, blood pressure control, GP practice visits, hospitalizations, emergency room visits for children with asthma, quality of life for COPD patients, oral contraceptive adherence, adherence to anti-epileptic drugs, pain control following gynaecological surgery, adherence to medication for depression	Length of visits to doctor for asthma patients, health status and use of health care services for epilepsy patients, adherence to Niacin and bile acid sequestrant therapy	9/5

Saultz & Lochner 2005 [43]	1967-2002, X out of 41 (CATHAL TO CHECK)	Range of settings	Varied	P	Continuity of care -ongoing relationship between individual doctor &patient (Surveys, continuity of care index)	Hospitalization rate, hospital readmission, length of stay, influenza immunization, preventive care, antibiotic compliance, ICU days, Neonatal morbidity, Apgar score, Birth weight, Rates and timeliness of childhood immunizations, health-related quality of life, recommended diabetes care measures, glucose control, PAP tests, mammogram rate, breast exams, surgical operation rates, hypertension control, presence of depression, relationship problems, adverse events in hospitalized patients, degree of patient enablement, rheumatic fever incidence	Diabetes (HbA1C, lipid control, blood pressure control, presence of diabetic complications), blood glucose control, functional ability of elderly patients, compliance with antibiotic therapy, well-child visits, blood pressure checks in women, pregnancy complications, newborn mortality, immunization rates, NICU admissions, Apgar scores, caesarean rate, length of labor, indications for tonsillectomy	51/30
Hall & Roter & Katz 1988 [73]	Meta-analysis 41 studies	Range of settings	Varied	P	Clinician-patient communication (Surveys, interviews, observations, assessment of video or audio)	Compliance (with 4 variables of PE), recall/understanding (with 4 variables of PE)	Compliance (with 1 variable of PE), recall/understanding (with 1 variable of PE)	8/2
Jackson, C. et al. 2010 [39]	1984-2008, 3 out of 17	Range of settings	Inflammatory bowel disease	P	Trust in physician, Patient-physician agreement, adequacy information (Surveys)	Adherence to treatment	Compliance	2/1
Sans-Coralles et al. 2006 [42]	1984-2005, 9 out of 20	Primary care	No specific disease focus	P	Continuity of care, coordination of care, consultation time, doctor-patient relationship (Validated tools in these different domains)	Hospital admissions, length of stay, compliance, recovery from discomfort, emotional health, diagnostic tests, referrals, quality of care for asthma, diabetes and angina, symptom burden, receipt of preventive services	Enablement	13/1
Hsiao & Boult 2008 [44]	1984-2003, 3 out of 14	Primary care	No specific disease focus	P	Continuity with physician (Surveys, interviews, medical records, chart reviews)	Hospitalisations for all conditions and ambulatory care-sensitive conditions, odds of hospitalisation(2), health care costs(2), emergency department visits, emergent hospital admissions(2), length of stay, diabetes recognition, mental health(2), pain, perception of health, well-being, BMI, trigliceride concentrations, recovery, clinical outcomes, self-reported health	Acute ambulatory care-sensitive conditions, mobility, pain, emotion, activities of daily living, smoking, BMI, hypertension, hypercholesterolemia, self-reported health, glycemic control, diabetes control, frequency of hypoglycemic reactions, blood sugar, weight	21/15

Arbuthnott et al. 2009 [28]	Meta analysis, 1955-2007, All 48 studies included	Range of settings	Asthma, bacterial infection, fibromyalgia, diabetes, renal disease, hypertension, congestive heart failure, inflammatory bowel disease, breast cancer, HIV, and tuberculosis	P	Physician–patient collaboration (Observation, surveys)	Medication adherence, behavioural adherence	Appointment adherence	2/1
Stewart 1995 [74]	1983-1993, 21 studies	Range of settings	Peptic ulcers, breast cancer, diabetes, hypertension, headache, coronary artery disease, gingivitis, tuberculosis, prostate cancer	P	Physician-patient communication (Surveys, evaluation of audio- or videotape recording)	Peptic ulcer physical limitation, blood glucose levels, blood pressure, headache resolution, physician evaluation of symptom resolution for coronary artery disease, gingivitis and tubercolosis, anxiety level in gynecological care, radiation therapy, breast cancer care, functional status following radiation therapy for prostate cancer, anxiety after radiation therapy, pain levels and hospital length of stay after intra-abdominal surgery, physical and psychological complaints in breast cancer care	Details not included	16/5
Zolnierek & DiMatteo 2009 [26]	Meta analysis 1949-2008, 127 studies	Range of settings	No specific disease focus	P	Physician-patient communication (Observation, surveys)	Adherence to treament recommended by clinician	Adherence (2 observational studies)	125/2
Beck et al. 2002 [75]	1975-2000, 5 out of 14	Primary care	No specific disease focus	P	Physician-patient communication (Observation, evaluation of audio and video tapes)	Compliance with doctors' advice, blood pressure, pill count	None	10/0
Cabana & Lee 2004 [20]	1966-2002, 7 out of 18	Range of settings	Rheumatoid arthritis, epilepsy, breast cancer, cervical cancer, diabetes	P	Continuity of care (Validated measures of continuity e.g. SCOC)	Hospitalizations, length of stay, emergency department visits, intensive care days, preventive medicine visits, drug or alcohol abuse, outpatient attendance, glucose control for adults with diabetes	None	18/5
Richards et al. 2006 [76]	1997-2002, 2 out of 33	Range of settings	Psoriasis	P	Patient's perception of care, satisfaction, interpersonal skills (Surveys, interviews)	Treatment adherence, medication use	None	2/0

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Title	A review of evidence on the links between patient experience and clinical safety and effectiveness
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Keywords:	Health & safety, Quality in healthcare, Health policy, Patient experience, Patient safety
Word Count	2521

Abstract

Objective: To explore evidence on the links between patient experience and clinical safety and effectiveness outcomes.

Design: Systematic review

Setting: A wide range of settings within primary and secondary care including hospitals and primary care centres.

Participants: A wide range of demographic groups and age groups.

Primary and secondary outcome measures: A broad range of safety and effectiveness outcomes including mortality, physical symptoms, length of stay and adherence to treatment.

Results: 55 articles met the inclusion criteria for this review. The evidence indicates consistent associations between patient experience, safety and effectiveness for a wide range of disease areas, settings, outcome measures and study designs. Evidence demonstrates associations between patient experience and self-rated and objectively measured health outcomes; adherence to recommended clinical practice and medication); preventive care (such as health-promoting behavior, use of screening services and immunization; and resource use (such as hospitalization, length of stay and primary care visits). There is some evidence of associations between patient experience and measures of the technical quality of care and adverse events. While some areas would benefit from further research, overall the count of associations found outweigh those not found.

Conclusion: The data presented shows associations between patient experience and clinical effectiveness and safety and supports the case for the inclusion of patient experience as one of the central pillars of quality in health care. It suggests that improvement of patient experience will increase the likelihood of improvements in the other two domains and supports the argument that the three measures should be looked at as a group and not in isolation. Clinicians should resist sidelining patient experience measures as too subjective or mood-orientated, divorced from the 'real' clinical work of measuring safety and effectiveness.

Trial registration: This review was not registered.

Article Summary

Article focus:

- Should patient experience, as advocated by the Institute of Medicine and the NHS Outcomes Framework, be seen as one of the pillars of quality in health care alongside clinical safety and effectiveness?
- What aspects of patient experience can be linked to health and safety outcomes?
- What evidence is available on the links between patient experience and clinical safety and effectiveness outcomes?

Key Messages:

- The results show that patient experience is consistently associated with patient safety and clinical effectiveness across a wide range of disease areas, study designs, settings, population groups and outcome measures.
- Patient experience is associated with: self-rated and objectively measured health outcomes; adherence to recommended medication and treatments; preventive care such as use of screening services and immunizations; healthcare resource use such as hospitalization and primary care visits; the technical quality of care delivery and adverse events
- Improvement to patient experience may increase the likelihood of improvements in clinical outcomes and patient safety.

Strengths and limitations of this study:

- This study demonstrates an approach to designing a systematic review for the 'catch-all' term patient experience, and brings together evidence from a variety of sources that may otherwise remain dispersed.
- This was a time-limited review and there is scope to expand this search based on the results and broaden the search terms to uncover further evidence.

Introduction

Patient experience is increasingly recognized as one of three pillars of quality in healthcare alongside safety and clinical effectiveness. [1] In the NHS the measurement of patient experience data to identify strengths and weaknesses of health care delivery, drive quality improvement, inform commissioning and promote patient choice is now mandatory.[2 3 4] In addition to data on harm avoidance or success rates for treatments, providers are now assessed on aspects of care such as dignity and respect, compassion and involvement in care decisions. [4] In England these data are published in Quality Accounts and the Commissioning for Quality & Innovation (CQUINs) payment framework makes a proportion of care providers' income conditional on improvement in this domain. [5]

The inclusion of patient experience as a pillar of quality is often justified on the grounds of its intrinsic value – that the expectation of humane, empathic care is a given and requires no further justification. It is also justified on more utilitarian grounds as a means of improving safety and effectiveness. [6 7] For example, clear information, empathic, two-way communication and respect for patients' beliefs and concerns could lead to patients being more informed and involved in decision making and create an environment where patients are more willing to disclose information. Patients could have more 'ownership' of clinical decisions, entering a 'therapeutic alliance' with clinicians. This could support improved and more timely diagnosis, clinical decisions and advice and lead to fewer unnecessary referrals or diagnostic tests.[8 9] Increased patient agency can encourage greater participation in personal care and compliance with medication, adherence to recommended treatment, monitoring of prescriptions and dose.[10 9] Patients can be informed about what to expect from treatment and be motivated to report adverse events or complications and keep a list of their medical histories, allergies, and current medications. [11]

Patients' direct experience of care process through clinical encounters or as an observer (for example, as a patient on a hospital ward) can provide valuable insights into everyday care. Examples include attention to pain control, assistance with bathing or help with feeding, or the environment (cleanliness, noise, physical safety) or coordination of care between professions or organizations. Given the organizational fragmentation of much healthcare care and the numerous services with which many patients interact, the measurement of patient experience may help provide a 'whole system' perspective not readily available from more discrete safety and effectiveness measures.[11]

Focusing on such utilitarian arguments, this study reviews evidence on links that have been demonstrated between patient experience and safety and effectiveness.

Methods

Identifying variables relevant to patient experience

Patient experience is a term that encapsulates a number of dimensions and in preliminary database searches this phrase on its own uncovered a limited number of studies. To broaden and structure the search for evidence, identify search terms and provide a framework for analysis it was necessary to identify what patient experience entails and outline potential pathways through which it is proposed to impact on safety and effectiveness. As such, we combined common elements from patient experience frameworks produced by The Institute of Medicine[1], Picker Institute[12] and NICE [13].

Table 1 delineates different dimensions of patient experience and distinguishes between 'relational' and 'functional' aspects. Relational aspects refer to interpersonal aspects of care – the ability of clinicians to empathise, respect the preferences of patients, include them in decision making and

provide information to enable self-care.[10] It also refers to patients' expectations that professionals will put their interest above other considerations and be honest and transparent when something goes wrong. [8 14] Functional aspects relate to basic expectations about how care is delivered, such as attention to physical needs, timeliness of care, clean and safe environments, effective coordination between professionals and continuity.

Table 1: Identifying aspects of patient experience and search terms

Relational aspects	Functional aspects
Emotional and psychological support, relieving fear and anxiety, treated with respect, kindness, dignity, compassion, understanding Participation of patient in decisions and respect and understanding for beliefs, values, concerns, preferences and their understanding of their condition Involvement of, and support for family and carers in decisions Clear, comprehensible information and communication tailored to patient needs to support informed decision (awareness of available options, risks and benefits of treatments) and enable self-care Transparency, honesty, disclosure when something goes wrong	Effective treatment delivered by trusted professionals Timely, tailored and expert management of physical symptoms Attention to physical support needs and environmental needs (e.g. clean, safe, comfortable environment) Coordination and continuity of care; smooth transitions from one setting to another

Using these frameworks and discursive documents in this area of research [10 15 16 9] as a guide we identified words and phrases commonly used to denote aspects of patient experience, examples of which are listed in Table 2.

Table 2: Search terms denoting patient experience:
patient-centred care; patient engagement; clinical interaction; patient-clinician; clinician-patient; patient-doctor; doctor-patient; physician-patient; patient-physician; patient-provider; interpersonal treatment; physician discussion; trust in physician; empathy; compassion; respect; responsiveness; patient preferences; shared decision making; therapeutic alliance; participation in decisions; decision making; autonomy; caring; kindness; dignity; honesty; participation; right to decide; physical comfort; involvement (of family, carers, friends); emotional support; continuity (of care); smooth transition; emotional support;

These were combined with search terms representing patient safety and effectiveness outcomes hypothesized to be associated with patient experience in discursive literature. We searched for a broad range of outcome measures, including both self-rated and 'objective' measurements of health status, physical and mental health and wellbeing, the use of preventive health services, compliance or adherence to health-promoting behavior and resource use.

Combining these two sets of search terms in the EMBASE database, we identified 5323 papers whose abstracts were then reviewed. If deemed relevant the full article was retrieved to assess whether it met the inclusion criteria.

Given concerns about the sole use of protocol-driven search strategies for complex evidence[17] we combined this search with a 'snowballing' method, pursuing references of references, citations and 'related articles' functions in PubMED for those articles identified in the initial search.

Inclusion criteria, assessment of quality and categorisation of evidence

We included studies that measured associations between patients' reporting of their experience and safety and effectiveness outcomes. These included studies measuring associations between experience and outcomes at either at a patient level (i.e data on both types of variables for the same patients) or at an organizational level (i.e. associations between aggregated patient measures of experience and outcomes for the same type of organisation such as a hospital or primary care practice). (TEXT REMOVED …We excluded studies of interventions to improve aspects of relevance to patient experience, although we refer to some of this evidence in the discussion).

We included studies where the variables denoting both patient experience and safety and effectiveness were measured in a credible way, through the use of validated tools. For patient experience variables these include surveys covering several aspects of experience (such as Picker Surveys and the Hospital Consumer Assessment of Healthcare Providers and Systems survey) and specific aspects (such as a 'Working Alliance Scale'[18] , Multidimensional Health Locus of Control Scale (MHLC) scale[19] or usual provider continuity (UPC) index[20]). For safety and effectiveness these include, for example, generic health and quality of life surveys (such as Short-Form 36 (SF36)), disease-specific surveys (such as the Seattle Angina Questionnaire[21]) measures of the technical quality of care (such as the Hospital Quality Alliance (HQA) score, reviews of medical records and care provider data. [22] Details of the methods used to measure both variables in each study are included in Tables 6 and 7.)

We included studies where the sample size of patients or organizations appeared sufficiently large to conduct meaningful statistical analysis (excluding studies with fewer than 50 subjects) and took account of differences in perspectives between demographic groups. When extracting data relevant to our study from systematic reviews we selected only those studies that met these criteria.

We then counted both associations found and not found for each study. Associations refer to cases where one measure of patient experience (typically an overall rating of patient experience for a care provider) has a statistically significant association with one or more effectiveness or safety variable. If a study showed associations between several aspects of patient experience that appeared to be closely related (for example, 'listening', 'empathy', or 'respect') and an aspect of effectiveness or safety, this was counted as one association found. This was to avoid exaggerating the weight of the evidence by 'over counting' associations.

Two main types of studies emerged in the search – those focusing on interventions to improve aspects of patient experience and those exploring associations between patient experience variables and safety and effectiveness variables. To manage the scope of this time-limited review we decided to restrict analysis of the large number of interventions to the evidence contained within systematic reviews.

(TEXT REMOVED) Table 2 presents evidence in order of patient experience focus, distinguishing between those articles with a broad focus (looking at both 'relational and functional' aspects outlined in Figure 1) and those focusing on a single aspect. Within these categories, studies are then presented in order of breadth of disease focus and then by study design (with systematic reviews presented first).

Overall, the evidence indicates associations between patient experience and safety and effectiveness that appear consistent across a range of disease areas, study designs, settings, population groups and outcome measures. Associations found outweigh those not found by 429 to 127. Of the four studies where evidence against associations outweigh evidence for associations there is no suggestion that these are methodologically superior.

Table 3 shows surveys to be the predominant method used to measure variables for individual studies.

Table 3: Methods used to measure variables

	No of studies
Patient experience variables	
Survey	31
Interviews	2
Medical records	1
Effectiveness & safety variables	
Survey for self-rated healthcare	12
Other survey	14
Medical records	3
Data monitoring quality of care delivery (e.g. audit, HQA, HEDIS)	3
Care provider outcome data	3
Physical examination	1
Patient interviews	2

Chart 1 outlines the disease areas covered. **(Chart 1 inserted here)**

Table 4 presents the frequency of associations categorized by type of outcomes (where a description was available). These include; objectively measured health outcomes (for example, 'mortality', 'blood glucose levels', 'infections', 'medical errors'); self-reported health and wellbeing outcomes (for example, 'health status', 'functional ability' 'quality of life', 'anxiety'); adherence to recommended treatment and use of of preventive care services likely to improve health outcomes (for examples, 'medication compliance', 'adherence to treatment' and screening for a variety of conditions); outcomes related to healthcare resource use (for example 'hospitalizations', 'hospital readmission', 'emergency department use', 'primary care visits'); errors or adverse events and measures of the technical quality of care.

Table 4: Associations categorised by type of outcome

	Objective' health outcomes	Self-reported health and wellbeing	Adherence to treatment (including medication)	Preventive care	Healthcare resource use	Adverse events	Technical quality of care	All categories
No. of associations found	29	61	152	24	31	7	8	312
No. of associations not found	11	36	7	2	6	0	4	66

Table 5 shows associations categorised by type of care provider and for chronic conditions.

Table 5: Weight of evidence by provider and for chronic conditions	Associations found	Associations not found
Primary care	110	48
Hospital	43	17
Chronic conditions	53	9

Tables 6 and 7 present details of all studies identified, specifying the analytical focus of each study, methods to measure variables and associations found.

(TEXT AND PREVIOUS TABLE 3 REMOVED ?Table 3 outlines the range of outcome measures where associations with patient experience and outcomes related to safety and effectiveness were demonstrated.)

Table 3: Outcomes related to safety and effectiveness demonstrated

Category	Associations demonstrated	Count
Adherence	Adherence to/compliance with medications and recommended treatment	16

Screening	Cancer screening, Cholesterol screening	8
Symptoms	Symptom burden, discomfort & concern	7
Hospitalization & Length of Stay	Hospitalization, length of stay	6
Doctor visits	Doctor visits, Well-child visits, Preventive visits, Prenatal visits	6
Immunization	Use and timeliness of Immunization services - MMR vaccination, influenza	5
Diabetes care	Diabetes self-management and adherence to recommended care, blood glucose control	5
Self reported health	Self reported health and well-being	4
Function	Functional status, physical function, physical mobility	4
Blood pressure	Blood pressure control, Hypertension control	3
Pain	Pain levels	2
Patient ability	Patient ability to deal with dyspnea, angina	2
Mortality	Inpatient mortality, mortality	2

(TEXT REMOVED – REPLACED WITH MORE DETAILED DISCUSSION BELOW) This review found numerous studies showing associations between patients' rating of their experience and adherence to medical treatment and advice, compliance with medication, symptom resolution and self-rated health. There is consistent evidence of better use of preventive services such as cancer screening and immunization. Some studies show an association with physical health outcome measures including blood pressure, blood glucose and mortality.

There is also evidence showing associations between patients' perspective or observations of processes of care and the technical quality and safety of care for the same population group recorded through other means. For example, two large-scale studies of hospitals in the US found patient experience measures associated with technical quality of care for myocardial infarction, congestive heart failure, pneumonia and complications from surgery. A similar study in primary care found associations between patient experience and processes of care related to prevention and disease management. Other studies comparing interviews with patients on their experience of individual adverse events with the official reporting of these same events by staff, found underreporting by healthcare providers.

Table 3 and 4 focus on studies where associations with safety and effectiveness were demonstrated. Not all studies demonstrated associations, but those showing associations between patient experience and the other two domains of quality outweigh those that don't.)

Discussion

Overall, the evidence indicates associations between patient experience, safety and effectiveness that appears consistent across a range of disease areas, study designs and settings.

As Table 4 indicates, the evidence shows associations found outweigh those not found for both self-assessment of physical and mental health (61 vs 36) and 'objective' measures of health outcomes (e.g. where measures are taken by a clinician or by reviewing medical records) (29 vs 11). For objective measures, one study [23] shows associations for ulcer disease, hypertension and breast cancer. Two studies on myocardial infarction show associations with survival one year after discharge [24] and inpatient mortality. [25] Objective measurement is less frequently explored than self-rated health and is an area that could benefit from further research.

Evidence is strong in the case of adherence to recommended medical treatment. A meta-analysis included in this study showed associations between the quality of patient communications and adherence to medical treatment in 125 out of 127 studies analysed and showed the odds of patient adherence 1.62 times higher for physicians with communication training compared to those without.[26] Regarding compliance with medication, associations found outweigh those not found. [19 27-33] A review of interventions to increase adherence to medication (not included in this study) showed communication of information, good provider-patient relationships and patients' agreement with the need for treatment as common determinants of effectiveness. [34] There is evidence of better use of preventive services, such as screening services in diabetes, colorectal, breast and cervical cancer; cholesterol testing and immunization. [23 35-38] There is also evidence of impacts on resource use of primary and secondary care (such as hospitalizations, readmissions and primary care visits). [20 27 39-44]

For studies exploring associations between patient experience and technical quality of care measured by other means the evidence is mixed. Two studies in acute care (ADD REFS) showed associations between overall ratings of patient experience and ratings of the technical quality of care (using Hospital Quality Alliance (HQA) measures) for myocardial infarction, congestive heart failure, pneumonia and complications from surgery. [22 45] Another found an association with adherence to clinical guidelines for acute myocardial infarction.[25] A similar study in primary care found associations between patient experience of processes and measurement of care quality (from the HEDIS system measuring care quality for disease prevention and management in chronic conditions). [35] However, two other studies found no associations between patients' ratings and ratings based on an assessment of medical records.[46 47]

There is evidence showing associations between patients' perspective or observations of processes of care and the safety of care recorded through other means. Isaac (add ref) found associations between ratings of patient experience and six patient safety indicators (decubitus ulcer; failure to rescue; infections due to medical care; postoperative hemorrhage, respiratory failure, pulmonary embolism and sepsis). Two studies, examining evidence for patients' ability to identify medical errors or adverse events in hospital, showed associations between patients' accounts of their experience of adverse events and the documentation of events in medical records.[48 49] But another s study shows only 2% of patient-reported errors were classified by medical reviewers as 'real clinical medical errors' with most 'reclassified' by clinicians as 'misunderstandings' or 'behaviour or communication problems'.[50] Overall there is less evidence available on safety compared to effectiveness and this should be a priority for future research in this area.

Research from other studies not included in this review support these findings. For example, research on 'decision aids' to ensure patients are well informed about their treatments and that decisions reflect the preferences of patients indicate that patient engagement has a beneficial impact on outcomes. For example, awareness of the risks of surgical procedures resulted in a 23% reduction in surgical interventions and better functional status. [51] Another review showed that provision of good information and emotional support are associated with better recovery from surgery and heart attacks. [52]

Study strengths and limitations

This review builds on other studies[9 10 15 16] demonstrating links between these three domains. This study also demonstrates an approach to designing a systematic search for evidence for the 'catch-all' term patient experience, bringing together evidence from a variety of sources that may otherwise remain dispersed. This approach can be used or adapted for further research in this area.

This was a time-limited review and there is scope to expand this search based on our results. There may be scope to broaden the search terms and this may uncover further evidence. The first search was confined to one database and the review focused primarily on peer-reviewed literature excluding gray literature. To manage the scope of this review we decided to restrict the analysis of interventions to improve patient experience to evidence within systematic reviews. The suggested association between measures of patient experience and safety and effectiveness described does not entail causality. Although all associations included in the study are statistically significant, the strength of associations vary. Due to time constraints and the heterogeneity of measures used we did not systematically compare the strengths of associations in different studies but this may be an area for future work. As always, there may be a publication bias in favour of studies showing positive associations between patient experience variables and safety and effectiveness outcomes[53] In addition, most studies were conducted in the United States and caution is needed about their applicability to other healthcare systems.

Although there are areas that would benefit from further research, the data presented supports the view that patient experience data, robustly collected and analysed, may highlight strengths and risks in effectiveness and safety and that focusing on improving patient experience will increase the likelihood of improvements in the other two domains. There are aspects of patient experience that will help to explain performance in safety and effectiveness and vice-versa.

Conclusion

The evidence suggests that attention to these various dimensions of patient-centred care outlined in Table 1 may result in important clinical benefits and more effective use of health care resources, particularly for chronic conditions, where most healthcare resources are consumed. There is also some evidence to suggest that patients can be used as partners in identifying poor and unsafe practice and help enhance quality and safety.

This supports the argument that the three measures should be looked at as a group and not in isolation. Clinicians should resist sidelining patient experience measures as too subjective or mood-orientated, divorced from the 'real' clinical work of measuring and delivering safety and effectiveness.

Table 6: Individual studies

Author	Type of study, sample size, country	Setting	Disease focus	Unit of analysis (Patient (P) or org (O)	Patient experience focus and method used -	Safety & effectiveness measure -	Association demonstrated	Association NOT demonstrated	Assoc. Found vs NOT found
Chang et al. 2006[47]	Cohort study, 236 patients, US	Managed care organisation	22 clinical conditions	P	Providers communication (The Consumer Assessment of Healthcare Providers and Systems survey and 'Quality of care')	Technical quality and patient global ratings (Medical records and patient interviews)	None	Technical quality of care	0/1
Sequist et al. 2008[35]	Cross-sectional study, 492 settings, US	Primary care	Cervical, breast and colorectal cancer, chlamydia, cardiovascular conditions, asthma, diabetes	P	Doctor-patient communication, clinical team interactions, organizational features of care (The Ambulatory Care Experiences Survey)	Clinical quality focusing on disease prevention, disease management and outcomes of care (Healthcare Effectiveness Data and Information Set (HEDIS))	Cervical cancer, breast cancer and colorectal cancer screening, Chlamydia screening, Cholesterol screening (cardiac), LDL cholesterol testing (diabetes), eye exams (diabetes), HbA1c testing, nephropathy screening	Cholesterol management, HbA1c control, LDL cholesterol control, blood pressure control	9/4
Burgers et al. 2010[54]	Survey, 8973 patients, Range	Range of settings	Chronic lung, mental health, hypertension, heart disease, diabetes, arthritis, cancer.	P	Coordination of care and overall experience (Commonwealth Fund International Health Policy Survey)	Morbidity score	Morbidity score	None	1/0
Kaplan et al. 1989 [23]	Randomised control trial, 252 patients, US	Range of settings	Ulcer disease, hypertension, diabetes, breast cancer	P	Physician-patient communication (Assessment of audio tape and questionnaire)	Physiologic measures taken at visit and patients' self-rated health status survey.	Follow up blood glucose and blood pressure, functional health status, self reported health status.	None	4/0
Jha et al. 2008 [22]	Cross-sectional study, 2429 settings, US	Hospital	Acute myocardial infarction, congestive heart failure, pneumonia complications from surgery.	O	Patient communication with clinicians, expereince of nursing services, discharge planning (Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey)	Technical quality of care using Hospital Quality Alliance (HQA) score	Technical quality of care in AMI, CHF, pneumonia, surgical care	None	4/0

Rao et al. 2006 [46]	Cross sectional study, 3487 patients, UK	Primary care	Hypertension, Influenza vaccination	P	Older patients' experience of technical quality of care (General Practice Assessment survey)	Technical quality of care - (medical records)	None	Hypertension monitoring and control, influenza vaccination.	0/3
Meterko et al. 2010 [24]	Cohort study, 1858 patients, US	Veteran Affairs Medical Centres	Acute myocardial infarction	P	Patient-centred care, access, courtesy, information, coordination, patient preferences, emotional support, family involvement, physical comfort (VA Survey of Healthcare Experiences of Patients (SHEP))	Survival 1-year postdischarge	Survival 1-year postdischarge	None	1/0
Vincent et al. 1994 [55]	Cohort Survey 227 patients, UK	Range of settings	Varied	P	Accountability, explanation, standards of care, compensation (Questionnaire)	Legal action	Legal action	None	1/0
Agoritsas et al. 2005 [56]	Cohort patient survey, 1518 patients, Switzerland	Hospital	Varied	P	Global rating of care and respect and dignity questions (Picker survey)	Patient reports of undesirable events (survey)	Neglect of important information by health care staff, pain control, needless repetition of a test, being handled with roughness	None	4/0
Flocke et al. 1998 [36]	Cross-sectional study, 2889 patients, US	Primary care	Varied	P	Interpersonal communication, physician's knowledge of patient, coordination (Components of Primary Care Instrument (CPCI))	Use of preventive care services (screening, health habit counseling services, immunization services)	Screening, health habit counselling, immunization	None	3/0
Jackson, J. et al. 2001 [57]	Quantitative Cohort study 500 patients, US	General medicine walk-in clinic	Varied	P	Patient satisfaction (RAND 9-item survey)	Functional status (Medical Outcomes Study Short-Form Health Survey [SF-6]), symptom resolution, (RAND 9-item survey), follow-up visits	Symptom resolution, repeat visits, functional status	None	3/0

Clark et al. 2007 [40]	Randomized control trial 731 patients, US	Range of settings	Asthma	P	Patient experience of physician communication (Patient interviews and Lickert Scale)	Emergency department visits, hospitalizations, office phone calls and visits, urgent office visits (Survey + Medical chart review of 6% of patients to verify responses.)	Number of office visits, emergency visits, urgent office visits, phone calls, hospitalizations	None	5/0
Raiz et al. 1999 [19]	Quantitative Cohort Study, 357 patients, US	Primary care	Renal transplant	P	Patient faith in doctor (Multidimensional Health Locus of Control Scale (MHLC))	Medication compliance	Remembering medications, taking medications as prescribed	None	2/0
Kahn et al. 2007 [30]	Cohort study, 881 patients, US	Hospitals	Breast cancer	P	Level of physician support, participation in decision-making and information on side effects (Survey)	Medication adherence	Ongoing tamoxifen use	None	1/0
Plomondon et al. 2008 [21]	Cohort study, 1815 patients, US	Hospital	Myocardial infarction	P	Satisfaction with explanations from their doctor, overall satisfaction with treatment (Seattle Angina questionnaire)	Presence of angina (Seattle Angina Questionnaire)	Presence of angina	None	1/0
Fuertes et al. 2008 [18]	Survey, 152 patients, US	Hospital	Neurology	P	Physician–patient communication, Physician–Patient Working Alliance, Empathy, Multicultural Competence (Questionnaire)	Adherence to medical treatment (Adherence Self-Efficacy Scale and Medical Outcome Study (MOS) Adherence Scale).	Adherence to treatment	None	1/0
Lewis et al. 2010 [29]	Qualitative cohort study, 191 patients, US	Primary care	Pain	P	Doctor–Patient Communication (Survey)	Medication adherence (Prescription Drug Use Questionnaire (PDUQ))	Use of Prescribed Opioid Medications	None	1/0

Safran et al. 1998 [58]	Cross-sectional study, 7204 patients, US	Primary care	Varied	P	Accessibility, continuity, integration, clinical interaction, interpersonal aspects, trust (The Primary Care Assessment Survey)	Adherence to physician's advice, health status, health outcomes (Medical Outcomes Study (MOS), Behavioral Risk Factor Survey.)	Adherence, health status	Health outcomes	2/1
Alamo et al. 2002 [59]	Randomized study, 81, Spain	Primary care	Chronic musculoskeletal pain (CMP), fibromyalgia	P	Patient centered-care ('Gatha-Res questionnaire' and follow-up phone call)	Pain (Visual Analogue Scale (VAS) anxiety (Oldberg scale of anxiety and depression (GHQ))	Anxiety, number of tender points (pain)	Pain, pain intensity, pain as a problem, number of associated symptoms, depression, physical mobility, social isolation, emotional reaction, sleep	2/10
Fan et al. 2005 [60]	Survey, 21689 patients, US	Primary care	Cardiac care, diabetes, COPD	P	Communication skills and humanistic qualities of primary care physician (Seattle Outpatient Satisfaction Survey)	Physical and emotional aspects, coping ability and symptom burden for angina, COPD and diabetes (Seattle Angina Questionnaire (SAQ), Obstructive Lung Disease Questionnaire (SOLDQ), Diabetes Questionnaire (SDQ))	Patient ability to deal with all 3 diseases, education for diabetes patients, angina stability, physical limitation due to angina	Self-reported physical limitation for angina and COPD, symptom burden for diabetes, complications for diabetes	7/4
O'Malley et al. 2004 [37]	Cross-sectional study, 961 patients, US	Primary care	Varied	P	Patient trust (Survey)	Use of preventive care services	Blood pressure measurement , height and weight measurement, cholesterol check, pap tests, breast cancer screening, colorectal cancer screening, discussion of diet, discussion on depression	None	8/0
Little et al. 2001 [61]	Survey, 865 patients, UK	Primary care	varied	P	Patient centredness (Survey)	Enablement, symptom burden, resource use	Enablement, symptom burden, referrals	Reattendance, investigations	3/2

Levinson et al. 1997 [62]	Qualitative cohort study, 124 physicians, US	Primary care	Varied	P	Physician-patient communication (Assessment of audiotape)	Malpractice	Malpractice claims	None	1/0
Carcaise-Edinboro & Bradley 2008 [38]	Cross sectional study, 8488 patients, US	Primary care	Colorectal cancer	P	Patient-provider communication (Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey)	Colorectal Cancer screening, fecal occult blood testing, and colonoscopy (Medical Expenditure Panel Survey)	CRC screening, fecal occult blood testing, colonoscopy	None	3/0
Schneider et al. 2004 [31]	Cross-sectional analysis study, 554 patients, US	Primary care	HIV	P	Physician-patient relationship (Survey)	Adherence (Survey)	Adherence to antiretroviral therapy	None	1/0
Schoenthaler et al. 2008 [32]	Cross-sectional study, 439 patients, US	Primary care	Hypertension	P	Patients' perceptions of providers' communication (Survey)	Medication adherence (Morisky self-report measure)	Medication adherence	None	1/0
Slatore et al. 2010 [63]	Cross sectional study, 342 patients, US	Range of settings	COPD	P	Patient-clinician communication (Quality of communication questionnaire (QOC))	Self-reported breathing problem confidence, and general self-rated health (Survey)	Confidence in dealing with breathing problems	Self-rated health	1/1
Lee & Lin 2009 [64]	Cohort study, 480 patients, Taiwan	Range of settings	Type 2 diabetes	P	Trust in physicians (Survey)	Self-eficacy, adherence, health outcomes (Multidimensional Diabetes Questionnaire and 12-Item Short-Form Health Survey (SF-12))	Physical HRQoL, mental HRQoL, body mass index HbA1c, triglycerides, complications, self-efficacy, outcome expectations, adherence	None	9/0
Heisler et al. 2002 [33]	Survey, 1314 patients, US	primary care	Diabetes	P	Physician communication, physician interaction styles, participatory decision making (Questionnaire)	Disease management (Surveys and national databases)	Overall self-management, diabetes diet, medication compliance, exercise, blood glucose monitoring, foot care.	Exercise	6/1

Lee & Lin 2010 [65]	Cohort study, 614 patients, Taiwan	Range of settings	Type 2 diabetes	P	Patients' perceptions of support, autonomy, trust, satisfaction (Health Care Climate Questionnaire and Autonomy Preference Index (API))	Glycosylated hemoglobin (HbA1C) (medical records) Physical and mental health-related qality of life (HRQoL) (SF-12)	Physical HRQoL, mental HRQoL	Information preference interaction, HbA1C	2/2
Kennedy A. et al. 2003 [66]	Randomised control trial, 700 patients, UK	Hospital	Inflammatory bowel Disease	P	Patient centered-care (Interviews)	Resource use, self-rated physical and mental health, enablement (Patient diaries, questionnaires, medical records)	Ability to cope with condition, symptom relapses, hospital visits, appointments made	Physical functioning, role limitations, social functioning, mental health, energy/vitality, pain, general health perception, anxiety, number of relapses, number of medically-defined relapses, average relapse duration, frequency of GP visits, delay before starting treatment	4/13
Stewart et al. 2000 [41]	Observational Cohort study, 315 patients, Canada	Primary care	General	P	Patient-centred communication (Assessment of audiotape and Patient-Centered Communication Score tool)	Discomfort (VAS) symptom severity severity (Visual Analogue Scale), Health Status (Short Form-36 SF-36) Quality of care provision (Chart review by doctors)	Symptom discomfort & concern, self-reported health, diagnostic tests, referrals, and visits to the family physician	None	5/2
Kinnersley et al. 1999 [67]	Observational Study, 143 patients, UK	Primary care	Varied	P	Patient-centredness (Assessment of audiotape and questionnaires)	Symptom resolution, resolution of concerns, functional health status (Questionnaire)	None	Resolution of symptoms, resolution of concerns, functional health status	0/3

Solberg et al. 2008 [50]	Survey, 3109 patients, US	Primary care - multispecialty group	Varied	P	Patient experience of errors (Survey)	Review of errors (Chart audits and physician reviewer judgements)	None	None	1/0
Isaac et al. 2010 [45]	Cross-sectional study, 927 hospitals, US	Hospital	Acute myocardial infarction, congestive heart failure, pneumonia complications from surgery.	O	General patient experiences (Hospital Consumer Assessment of Healthcare Providers and Systems survey (HCAHPS))	Processes of care (Health Quality Alliance (HQA) database) and Patient Safety Indicators	Decubitus ulcer rates, infections, processes of care for pneumonia, CHF and myocardial infarctions, surgical composites, hemorrage, respiratory failure, DVT, pulmonary embolism, sepsis	Failure to rescue	11/1
Glickman et al. 2010 [25]	Cohort Study, 3562 patients, US	Hospital	Acute myocardial infarction	P	Patient satisfaction (Press-Ganey survey)	Adherence to practice guidelines, outcomes (CRUSADE quality improvement registry).	Inpatient mortality, composite clinical measures, AMI survival	None	3/0
Fremont et al. 2001 [68]	Survey, 1346 patients, US	Hospital	Cardiac	P	Patient centred care (Picker survey)	Processes of care, functional health status, cardiac symptoms (Medical Outcomes Study questionnaire, London School of Hygiene measures for cardiac symptoms)	Overall health, chest pain, patient reported general physical and mental health status	Mental health, shortness of breath	5/2
Riley et al. 2007 [69]	Survey, 506 patients, Canada	Hospital	Cardiac care - acute coronary	P	Continuity of care (The Heart Continuity of Care Questionnaire, Medical Outcome Study Social Support Survey, Illness Perception Questionnaire)	Participation in cardiac rehabilitation, perception of illness, functional capacity (Duke Activity Status Index (DASI))	Cardiac rehabilitation participation, perceptions of illness consequences	None	2/0
Weingart et al. 2005 [48]	Cohort study, 228 patients, US	Hospital	Varied	P	Patient experience of adverse events (Interviews)	Adverse events (Medical records and patient interviews)	Adverse events	None	1/0
Weissman et al. 2008 [49]	Survey, 998 patients, US	Hospital	Varied	P	Patient experience of adverse events (Interviews)	Adverse events (Medical records)	Adverse events	None	1/0

Table 7: Systematic reviews

Authors	Timespan & studies meeting inclusion criteria	Health care setting	Disease areas covered	Unit of analysis	Patient experience focus (and measurement methods)	Safety & effectiveness measure - association demonstrated -	Safety & effectiveness measure - association NOT demonstrated	Assocs found vs not found
Blasi et al. 2001 [70]	1974-1998, 4 out of 25	Range of settings	Asthma, hypertension, cancer, insomnia, menopause, obesity, tonsilitis	P	Provider behaviour and communication (Grading of consultations)	Health status, symptom improvement, treatment effectiveness, fear of injection, anxiety, ratings of pain, number of doctor visits, pain, speed of recovery	Comfort, recovery time, return visits	9/3
Drotar 2009 [27]	1998-2008, 4 out of 22	Range of settings	Asthma, cystic fibrosis, diabetes, epilepsy, inflammatory bowel disease, juvenile rheumatoid arthritis	P	Physician and staff behavior (Surveys, interviews, medical records)	Treatment adherence, compliance, office visits, phone calls, hospitalizations	Medication adherence	5/1
Hall et al. 2010 [71]	1990-2009, 10 out of 14	Range of settings	Brain injury, musculoskeletal conditions, cardiac conditions, trauma, back, neck and shoulder pain	P	Therapist-patient relationship, therapeutic alliance (Surveys, audio/video taped session)	Adherence, employment status, physical training, therapeutic success, perceived effect of treatment, pain, physical function, depression, general health status, attendance, floor-bench lifts, global assessment scores, ability to perform ADLs, mobility	Weekly physical training, disability, productivity, depression, functional status, adherence	18/6
Stevenson et al. 2004 [72]	1991-2000, 7 out of 134	Range of settings	Hypertension, asthma, chronic obstructive pulmonary disorder, ovarian cancer, epilepsy, hyperlipidaemia	P	Doctor-patient communication (Surveys)	Self-reported adherence, blood pressure control, GP practice visits, hospitalizations, emergency room visits for children with asthma, quality of life for COPD patients, oral contraceptive adherence, adherence to anti-epileptic drugs, pain control following gynaecological surgery, adherence to medication for depression	Length of visits to doctor for asthma patients, health status and use of health care services for epilepsy patients, adherence to Niacin and bile acid sequestrant therapy	9/5

Saultz & Lochner 2005 [43]	1967-2002, X out of 41 (CATHAL TO CHECK)	Range of settings	Varied	P	Continuity of care -ongoing relationship between individual doctor &patient (Surveys, continuity of care index)	Hospitalization rate, hospital readmission, length of stay, influenza immunization, preventive care, antibiotic compliance, ICU days, Neonatal morbidity, Apgar score, Birth weight, Rates and timeliness of childhood immunizations, health-related quality of life, recommended diabetes care measures, glucose control, PAP tests, mammogram rate, breast exams, surgical operation rates, hypertension control, presence of depression, relationship problems, adverse events in hospitalized patients, degree of patient enablement, rheumatic fever incidence	Diabetes (HbA1C, lipid control, blood pressure control, presence of diabetic complications), blood glucose control, functional ability of elderly patients, compliance with antibiotic therapy, well-child visits, blood pressure checks in women, pregnancy complications, newborn mortality, immunization rates, NICU admissions, Apgar scores, caesarean rate, length of labor, indications for tonsillectomy	51/30
Hall & Roter & Katz 1988 [73]	Meta-analysis 41 studies	Range of settings	Varied	P	Clinician-patient communication (Surveys, interviews, observations, assessment of video or audio)	Compliance (with 4 variables of PE), recall/understanding (with 4 variables of PE)	Compliance (with 1 variable of PE), recall/understanding (with 1 variable of PE)	8/2
Jackson, C. et al. 2010 [39]	1984-2008, 3 out of 17	Range of settings	Inflammatory bowel disease	P	Trust in physician, Patient-physician agreement, adequacy information (Surveys)	Adherence to treatment	Compliance	2/1
Sans-Coralles et al. 2006 [42]	1984-2005, 9 out of 20	Primary care	No specific disease focus	P	Continuity of care, coordination of care, consultation time, doctor-patient relationship (Validated tools in these different domains)	Hospital admissions, length of stay, compliance, recovery from discomfort, emotional health, diagnostic tests, referrals, quality of care for asthma, diabetes and angina, symptom burden, receipt of preventive services	Enablement	13/1
Hsiao & Boult 2008 [44]	1984-2003, 3 out of 14	Primary care	No specific disease focus	P	Continuity with physician (Surveys, interviews, medical records, chart reviews)	Hospitalisations for all conditions and ambulatory care-sensitive conditions, odds of hospitalisation(2), health care costs(2), emergency department visits, emergent hospital admissions(2), length of stay, diabetes recognition, mental health(2), pain, perception of health, well-being, BMI, trigliceride concentrations, recovery, clinical outcomes, self-reported health	Acute ambulatory care-sensitive conditions, mobility, pain, emotion, activities of daily living, smoking, BMI, hypertension, hypercholesterolemia, self-reported health, glycemic control, diabetes control, frequency of hypoglycemic reactions, blood sugar, weight	21/15

Arbuthnott et al. 2009 [28]	Meta analysis, 1955-2007, All 48 studies included	Range of settings	Asthma, bacterial infection, fibromyalgia, diabetes, renal disease, hypertension, congestive heart failure, inflammatory bowel disease, breast cancer, HIV, and tuberculosis	P	Physician–patient collaboration (Observation, surveys)	Medication adherence, behavioural adherence	Appointment adherence	2/1
Stewart 1995 [74]	1983-1993, 21 studies	Range of settings	Peptic ulcers, breast cancer, diabetes, hypertension, headache, coronary artery disease, gingivitis, tuberculosis, prostate cancer	P	Physician-patient communication (Surveys, evaluation of audio- or videotape recording)	Peptic ulcer physical limitation, blood glucose levels, blood pressure, headache resolution, physician evaluation of symptom resolution for coronary artery disease, gingivitis and tubercolosis, anxiety level in gynecological care, radiation therapy, breast cancer care, functional status following radiation therapy for prostate cancer, anxiety after radiation therapy, pain levels and hospital length of stay after intra-abdominal surgery, physical and psychological complaints in breast cancer care	Details not included	16/5
Zolnierek & DiMatteo 2009 [26]	Meta analysis 1949-2008, 127 studies	Range of settings	No specific disease focus	P	Physician-patient communication (Observation, surveys)	Adherence to treament recommended by clinician	Adherence (2 observational studies)	125/2
Beck et al. 2002 [75]	1975-2000, 5 out of 14	Primary care	No specific disease focus	P	Physician-patient communication (Observation, evaluation of audio and video tapes)	Compliance with doctors' advice, blood pressure, pill count	None	10/0
Cabana & Lee 2004 [20]	1966-2002, 7 out of 18	Range of settings	Rheumatoid arthritis, epilepsy, breast cancer, cervical cancer, diabetes	P	Continuity of care (Validated measures of continuity e.g. SCOC)	Hospitalizations, length of stay, emergency department visits, intensive care days, preventive medicine visits, drug or alcohol abuse, outpatient attendance, glucose control for adults with diabetes	None	18/5
Richards et al. 2006 [76]	1997-2002, 2 out of 33	Range of settings	Psoriasis	P	Patient's perception of care, satisfaction, interpersonal skills (Surveys, interviews)	Treatment adherence, medication use	None	2/0

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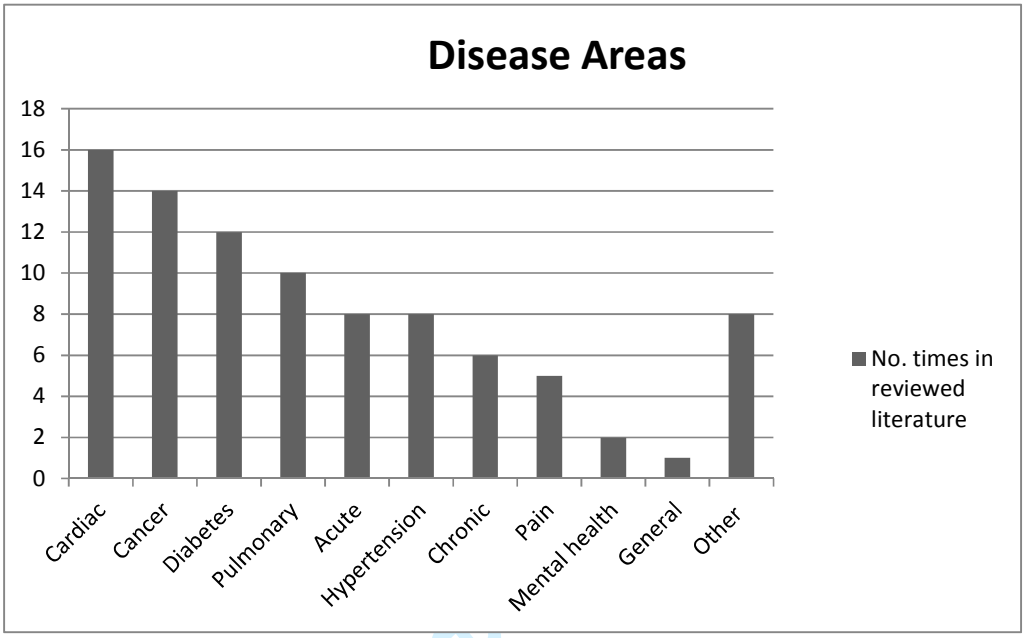
Chart 1: Disease areas covered



PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	n/a
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	6-7
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4-6
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5-6
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	6-7
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	6-7
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	7,13-20
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	n/a
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	n/a

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	11
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	n/a
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	4-7
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	13-20
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	11
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	13-20
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	n/a
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	11
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	n/a
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	9-11
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	11
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	11
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	21

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

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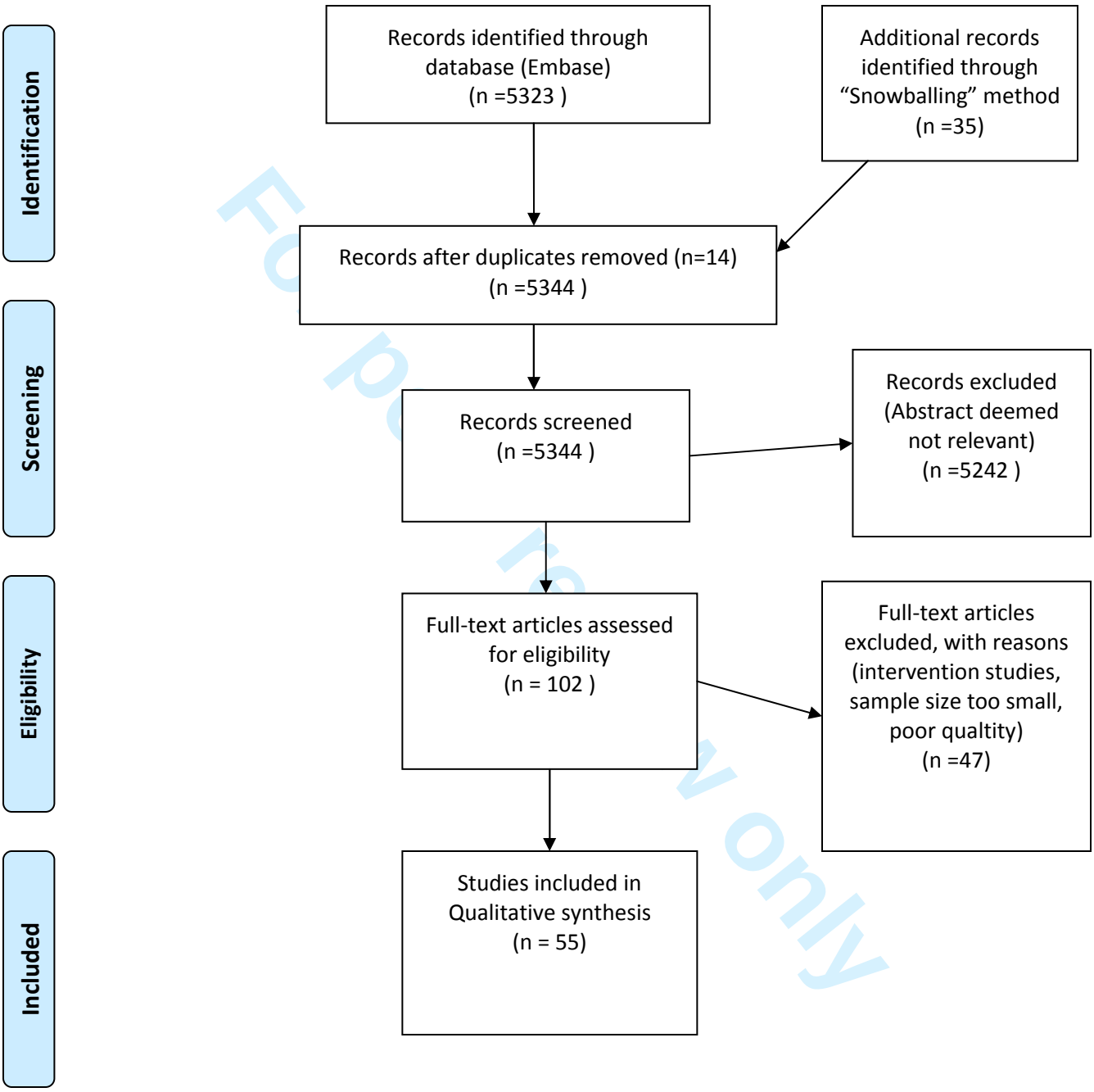
PRISMA 2009 Flow Diagram



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A review of evidence on the links between patient experience and clinical safety and effectiveness

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Title	A review of evidence on the links between patient experience and clinical safety and effectiveness
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Abstract

Objective: To explore evidence on the links between patient experience and clinical safety and effectiveness outcomes.

Design: Systematic review

Setting: A wide range of settings within primary and secondary care including hospitals and primary care centres.

Participants: A wide range of demographic groups and age groups.

Primary and secondary outcome measures: A broad range of patient safety and clinical effectiveness outcomes including mortality, physical symptoms, length of stay and adherence to treatment.

Results: This study, summarizing evidence from 55 studies, indicates consistent positive associations between patient experience, patient safety and clinical effectiveness for a wide range of disease areas, settings, outcome measures and study designs. It demonstrates positive associations between patient experience and self-rated and objectively measured health outcomes; adherence to recommended clinical practice and medication; preventive care (such as health-promoting behavior, use of screening services and immunization); and resource use (such as hospitalization, length of stay and primary care visits). There is some evidence of positive associations between patient experience and measures of the technical quality of care and adverse events. Overall it was more common to find positive associations between patient experience and patient safety and clinical effectiveness than no associations.

Conclusion: The data presented show positive associations between patient experience and clinical effectiveness and patient safety and supports the case for the inclusion of patient experience as one of the central pillars of quality in health care. It supports the argument that the three dimensions of quality should be looked at as a group and not in isolation. Clinicians should resist sidelining patient experience as too subjective or mood-orientated, divorced from the 'real' clinical work of measuring safety and effectiveness.

Trial registration: This review was not registered.

Article Summary

Article focus:

- Should patient experience, as advocated by the Institute of Medicine and the NHS Outcomes Framework, be seen as one of the pillars of quality in health care alongside patient safety and clinical effectiveness?
- What aspects of patient experience can be linked to clinical effectiveness and patient safety outcomes?
- What evidence is available on the links between patient experience and clinical effectiveness and patient safety outcomes?

Key Messages:

- The results show that patient experience is consistently positively associated with patient safety and clinical effectiveness across a wide range of disease areas, study designs, settings, population groups and outcome measures.
- Patient experience is positively associated with: self-rated and objectively measured health outcomes; adherence to recommended medication and treatments; preventative care such as use of screening services and immunizations; healthcare resource use such as hospitalization and primary care visits; technical quality of care delivery and adverse events.
- This study supports the argument that patient experience, clinical effectiveness and patient safety are linked and should be looked at as a group.

Strengths and limitations of this study:

- This study demonstrates an approach to designing a systematic review for the 'catch-all' term patient experience, and brings together evidence from a variety of sources that may otherwise remain dispersed.
- This was a time-limited review and there is scope to expand this search based on the results and broaden the search terms to uncover further evidence.

Introduction

Patient experience is increasingly recognized as one of the three pillars of quality in healthcare alongside clinical effectiveness and patient safety. [1] In the NHS the measurement of patient experience data to identify strengths and weaknesses of health care delivery, drive quality improvement, inform commissioning and promote patient choice is now mandatory.[2 3 4] In addition to data on harm avoidance or success rates for treatments, providers are now assessed on aspects of care such as dignity and respect, compassion and involvement in care decisions. [4] In England these data are published in Quality Accounts and the Commissioning for Quality & Innovation (CQUINs) payment framework which makes a proportion of care providers' income conditional on improvement in this domain. [5]

The inclusion of patient experience as a pillar of quality is often justified on the grounds of its intrinsic value – that the expectation of humane, empathic care is a given and requires no further justification. It is also justified on more utilitarian grounds as a means of improving patient safety and clinical effectiveness. [6 7] For example, clear information, empathic, two-way communication and respect for patients' beliefs and concerns could lead to patients being more informed and involved in decision making and create an environment where patients are more willing to disclose information. Patients could have more 'ownership' of clinical decisions, entering a 'therapeutic alliance' with clinicians. This could support improved and more timely diagnosis, clinical decisions and advice and lead to fewer unnecessary referrals or diagnostic tests.[8 9] Increased patient agency can encourage greater participation in personal care, compliance with medication, adherence to recommended treatment, and monitoring of prescriptions and dose.[9 10] Patients can be informed about what to expect from treatment and be motivated to report adverse events or complications and keep a list of their medical histories, allergies, and current medications. [11]

Patients' direct experience of care process through clinical encounters or as an observer (for example, as a patient on a hospital ward) can provide valuable insights into everyday care. Examples include attention to pain control, assistance with bathing or help with feeding, the environment (cleanliness, noise, physical safety) and coordination of care between professions or organizations. Given the organizational fragmentation of much of healthcare and the numerous services with which many patients interact, the measurement of patient experience may help provide a 'whole system' perspective not readily available from more discrete patient safety and clinical effectiveness measures.[11]

Focusing on such utilitarian arguments, this study reviews evidence on links that have been demonstrated between patient experience and clinical effectiveness and patient safety.

Methods

Identifying variables relevant to patient experience

Patient experience is a term that encapsulates a number of dimensions and in preliminary database searches this phrase on its own uncovered a limited number of useful studies. To broaden and structure the search for evidence, identify search terms and provide a framework for analysis it was necessary to identify what patient experience entails and outline potential mechanisms through which it is proposed to impact on safety and effectiveness. As such, we combined common elements from patient experience frameworks produced by The Institute of Medicine[1], Picker Institute[12] and NICE. [13]

Table 1 delineates different dimensions of patient experience and distinguishes between 'relational' and 'functional' aspects. [10 14] Relational aspects refer to interpersonal aspects of care – the ability of clinicians to empathise, respect the preferences of patients, include them in decision making and

provide information to enable self-care.[10] It also refers to patients' expectations that professionals will put their interest above other considerations and be honest and transparent when something goes wrong. [8 15] Functional aspects relate to basic expectations about how care is delivered, such as attention to physical needs, timeliness of care, clean and safe environments, effective coordination between professionals and continuity.

Table 1: Identifying aspects of patient experience and search terms

Relational aspects	Functional aspects
Emotional and psychological support, relieving fear and anxiety, treated with respect, kindness, dignity, compassion, understanding Participation of patient in decisions and respect and understanding for beliefs, values, concerns, preferences and their understanding of their condition Involvement of, and support for family and carers in decisions Clear, comprehensible information and communication tailored to patient needs to support informed decisions (awareness of available options, risks and benefits of treatments) and enable self-care Transparency, honesty, disclosure when something goes wrong	Effective treatment delivered by trusted professionals Timely, tailored and expert management of physical symptoms Attention to physical support needs and environmental needs (e.g. clean, safe, comfortable environment) Coordination and continuity of care; smooth transitions from one setting to another

Using these frameworks and discursive documents in this area of research [10 16 17 9] as a guide we identified words and phrases commonly used to denote aspects of patient experience, examples of which are listed in Table 2.

Table 2: Search terms denoting patient experience:
patient-centred care; patient engagement; clinical interaction; patient-clinician; clinician-patient; patient-doctor; doctor-patient; physician-patient; patient-physician; patient-provider; interpersonal treatment; physician discussion; trust in physician; empathy; compassion; respect; responsiveness; patient preferences; shared decision making; therapeutic alliance; participation in decisions; decision making; autonomy; caring; kindness; dignity; honesty; participation; right to decide; physical comfort; involvement (of family, carers, friends); emotional support; continuity (of care); smooth transition; emotional support;

These were combined with search terms representing patient safety and clinical effectiveness outcomes hypothesized to be associated with patient experience in discursive literature. We searched for a broad range of outcome measures, including both self-rated and 'objective' measurements of health status, physical and mental health and wellbeing, the use of preventive health services, compliance or adherence to health-promoting behavior and resource use.

Combining these two sets of search terms in the EMBASE database, we identified 5323 papers whose abstracts were then reviewed. If deemed relevant the full article was retrieved to assess whether it met the inclusion criteria.

(REVISED TEXT) Given concerns about the sole use of protocol-driven search strategies for complex evidence,[18] for the full text articles retrieved for review, we used a 'snowballing' approach to identify further studies. This involved sourcing further articles in these studies for assessment and using the 'related articles' function in the PubMED database. We repeated this for new articles identified until the approach ceased to identify new studies.

Inclusion criteria, assessment of quality and categorisation of evidence

We included studies that measured associations between patients' reporting of their experience and patient safety and clinical effectiveness outcomes. These included studies measuring associations between patient experience and safety or effectiveness outcomes either at a patient level (i.e data on both types of variables for the same patients) or at an organizational level (i.e. associations between aggregated measures of patient experience and safety and effectiveness outcomes for the same type of organisation such as a hospital or primary care practice).

We included studies where the variables denoting patient experience and patient safety and clinical effectiveness were measured in a credible way, through the use of validated tools. For patient experience variables these include surveys covering several aspects of experience (such as Picker Surveys and the Hospital Consumer Assessment of Healthcare Providers and Systems survey) and specific aspects (such as a 'Working Alliance Scale'[19] , Multidimensional Health Locus of Control Scale (MHLC) scale[20] or Usual Provider Continuity (UPC) index[21]). For patient safety and clinical effectiveness these include, for example, generic health and quality of life surveys (such as Short-Form 36 (SF36)), disease-specific surveys (such as the Seattle Angina Questionnaire[22]), measures of the technical quality of care (such as the Hospital Quality Alliance (HQA) score), reviews of medical records and care provider data.[23] Details of the methods used to measure variables in each study are included in Tables 6 and 7.

We included studies where the sample size of patients or organizations appeared sufficiently large to conduct meaningful statistical analysis (excluding studies with fewer than 50 subjects). When extracting data relevant to our study from systematic reviews we selected only those studies that met these criteria.

(REVISED TEXT) We then searched the studies' results for positive associations (where a better patient experience is associated with safer or more effective care), negative associations (where a better patient experience is associated with less safe or less effective care) and no associations. Associations refer to cases where one measure of patient experience (typically an overall rating of patient experience for a care provider) has a statistically significant association with one or more clinical effectiveness or patient safety variable. If a study showed associations between several aspects of patient experience that appeared to be closely related (for example, 'listening', 'empathy', or 'respect') and an aspect of effectiveness or safety, this was counted as one association found. This was to avoid exaggerating the weight of the evidence by 'over counting' associations.

Two main types of studies emerged in the search – those focusing on interventions to improve aspects of patient experience and those exploring associations between patient experience variables and patient safety and clinical effectiveness variables. To manage the scope of this time-limited review we decided to restrict analysis of the large number of interventions to the evidence contained within systematic reviews.

Results

Overall, the evidence indicates positive associations between patient experience and patient safety and clinical effectiveness that appear consistent across a range of disease areas, study designs, settings, population groups and outcome measures. Positive associations found outweigh 'no associations' by 429 to 127. Of the four studies where 'no associations' outweigh positive associations there is no suggestion that these are methodologically superior. (REVISED TEXT) Negative associations were rare. Of the 40 individual studies assessed in Table 6 negative associations (between patient experience of clinical team interactions and continuity of care and separate assessment of the quality of clinical care) were found in only one study.[24]

Table 3 shows surveys to be the predominant method used to measure variables for individual studies.

Table 3: Methods used to measure variables

	No of studies
Patient experience variables	
Survey	31
Interviews	2
Medical records	1
Effectiveness & safety variables	
Survey for self-rated healthcare	12
Other survey	14
Medical records	3
Data monitoring quality of care delivery (e.g. audit, HQA, HEDIS)	3
Care provider outcome data	3
Physical examination	1
Patient interviews	2

Chart 1 outlines the disease areas covered. **(Chart 1 inserted here)**

Table 4 presents the frequency of positive associations and 'no associations' categorized by type of outcomes (for 378 of the 556 cases where sufficient information was available to categorise). These include; objectively measured health outcomes (for example, 'mortality', 'blood glucose levels',

'infections', 'medical errors'); self-reported health and wellbeing outcomes (for example, 'health status', 'functional ability' 'quality of life', 'anxiety'); adherence to recommended treatment and use of preventive care services likely to improve health outcomes (for example, 'medication compliance', 'adherence to treatment' and screening for a variety of conditions); outcomes related to healthcare resource use (for example 'hospitalizations', 'hospital readmission', 'emergency department use', 'primary care visits'); errors or adverse events and measures of the technical quality of care.

Table 4: Associations categorised by type of outcome

	Objective' health outcomes	Self-reported health and wellbeing	Adherence to treatment (including medication)	Preventive care	Healthcare resource use	Adverse events	Technical quality of care	All categories
No. of positive associations found	29	61	152	24	31	7	8	312
'No associations'	11	36	7	2	6	0	4	66

Table 5 shows associations categorised by type of care provider (for the subset of studies focusing on one setting) and for studies focused on chronic conditions.

Table 5: Weight of evidence by provider and for chronic conditions

Weight of evidence by provider and for chronic conditions	Associations found	No associations
Primary care	110	48
Hospital	43	17
Chronic conditions	53	9

Tables 6 and 7 present details of all studies identified, specifying the analytical focus of each study, methods to measure variables and positive associations and 'no asscoiations' found.

Discussion

Overall, the evidence indicates associations between patient experience, clinical effectiveness and patient safety that appear consistent across a range of disease areas, study designs and settings.

As Table 4 indicates, the evidence shows positive associations found outweigh those not found for both self-assessment of physical and mental health (61 vs 36) and 'objective' measures of health outcomes (e.g. where measures are taken by a clinician or by reviewing medical records) (29 vs 11). For objective measures, one study [25] shows positive associations for ulcer disease, hypertension and breast cancer. Two studies on myocardial infarction show positive associations with survival one year after discharge [26] and inpatient mortality. [27] Objective measurement is less frequently explored than self-rated health and is an area that could benefit from further research.

Evidence is strong in the case of adherence to recommended medical treatment. A meta-analysis included in this study showed positive associations between the quality of clinician-patient communications and adherence to medical treatment in 125 out of 127 studies analysed and showed the odds of patient adherence was 1.62 times higher where physicians had communication training.[28] Regarding compliance with medication, positive associations found outweigh those not found. [20 29-35] A review of interventions to increase adherence to medication (not included in this study) showed communication of information, good provider-patient relationships and patients' agreement with the need for treatment as common determinants of effectiveness. [36] There is evidence of better use of preventive services, such as screening services in diabetes, colorectal, breast and cervical cancer; cholesterol testing and immunization. [24 25 37-39] There is also evidence of impacts on resource use of primary and secondary care (such as hospitalizations, readmissions and primary care visits). [21 29 40-45]

For studies exploring associations between patient experience and technical quality of care measured by other means, the evidence is mixed. Two studies in acute care showed positive associations between overall ratings of patient experience and ratings of the technical quality of care (using Hospital Quality Alliance (HQA) measures) for myocardial infarction, congestive heart failure, pneumonia and complications from surgery. [23 46] Another found an association with adherence to clinical guidelines for acute myocardial infarction.[27] A similar study in primary care found positive associations between patient experience of processes and measurement of care quality (from the HEDIS system measuring care quality for disease prevention and management in chronic conditions). [24] However, two other studies found no associations between patients' ratings and ratings based on an assessment of medical records.[47 48]

Some studies show positive associations between patients' perspective or observations of processes of care and the safety of care recorded through other means. Isaac [46] found positive associations between ratings of patient experience and six patient safety indicators (decubitus ulcer; failure to rescue; infections due to medical care; postoperative hemorrhage, respiratory failure, pulmonary embolism and sepsis). Two studies examining evidence for patients' ability to identify medical errors or adverse events in hospital showed positive associations between patients' accounts of their experience of adverse events and the documentation of events in medical records.[49 50] But another study shows only 2% of patient-reported errors were classified by medical reviewers as 'real clinical medical errors' with most 'reclassified' by clinicians as 'misunderstandings' or 'behaviour or communication problems'.[51] Overall there is less evidence available on safety compared to effectiveness and this should be a priority for future research in this area.

Research from other studies not included in this review support these findings. For example, research on 'decision aids' to ensure patients are well informed about their treatments and that decisions reflect the preferences of patients indicates that patient engagement has a beneficial impact on outcomes. For example, awareness of the risks of surgical procedures resulted in a 23% reduction in surgical interventions and better functional status. [52] Another review showed that provision of good information and emotional support are associated with better recovery from surgery and heart attacks. [53]

Study strengths and limitations

This review builds on other studies[9 10 16 17] exploring links between these three domains. This study also demonstrates an approach to designing a systematic search for evidence for the 'catch-all' term patient experience, bringing together evidence from a variety of sources that may otherwise remain dispersed. This approach can be used or adapted for further research in this area.

This was a time-limited review and there is scope to expand this search based on our results. There may be scope to broaden the search terms and this may uncover further evidence. The first search was confined to one database and the review focused primarily on peer-reviewed literature excluding gray literature. To manage the scope of this review we restricted the analysis of interventions to improve patient experience to evidence within systematic reviews. NEW TEXT While we used some quality criteria to filter studies (including the use of validated tools to measure experience, safety and effectiveness outcomes and sample size), with more time a more detailed formal quality assessment may have added value to the study. Although all positive associations included in the study are statistically significant, the strength of associations vary. Due to time constraints and the heterogeneity of measures used we did not systematically compare the strengths of positive associations in different studies but this may be an area for future work. NEW TEXT There may also be scope to explore whether future research in this area could go beyond the counting of associations in this study through, for example, meta-analysis. As always, there may be a publication bias in favour of studies showing positive associations between patient experience variables and safety and effectiveness outcomes.[54] In addition, 28 of the 40 individual studies assessed were conducted in the United States and caution is needed about their applicability to other healthcare systems.

Conclusion

The inclusion of patient experience as one of the pillars of quality is partly justified on the grounds that patient experience data, robustly collected and analyzed, may help highlight strengths and weaknesses in effectiveness and safety and that focusing on improving patient experience will increase the likelihood of improvements in the other two domains.[3]

The evidence collated in this study demonstrates positive associations between patient experience and the other two domains of quality. Because associations do not entail causality, this does not necessarily prove that improvements in patient experience will cause improvements in the other two domains. However, the weight of evidence across different areas of healthcare indicates that patient experience is clinically important. There is also some evidence to suggest that patients can be used as partners in identifying poor and unsafe practice and help enhance effectiveness and safety. This supports the argument that the three dimensions of quality should be looked at as a group and not in isolation. Clinicians should resist sidelining patient experience measures as too subjective or mood-orientated, divorced from the 'real' clinical work of measuring and delivering patient safety and clinical effectiveness.

Table 6: Individual studies

Author	Type of study, sample size, country	Setting	Disease focus	Unit of analysis (Patient (P) or org (O)	Patient experience focus and method used -	Safety & effectiveness measure -	Association demonstrated	Association NOT demonstrated	Assoc. Found vs NOT found
Chang et al. 2006[48]	Cohort study, 236 patients, US	Managed care organisation	22 clinical conditions	P	Providers communication (The Consumer Assessment of Healthcare Providers and Systems survey and 'Quality of care')	Technical quality and patient global ratings (Medical records and patient interviews)	None	Technical quality of care	0/1
Sequist et al. 2008[24]	Cross-sectional study, 492 settings, US	Primary care	Cervical, breast and colorectal cancer, chlamydia, cardiovascular conditions, asthma, diabetes	P	Doctor-patient communication, clinical team interactions, organizational features of care (The Ambulatory Care Experiences Survey)	Clinical quality focusing on disease prevention, disease management and outcomes of care (Healthcare Effectiveness Data and Information Set (HEDIS))	Cervical cancer, breast cancer and colorectal cancer screening, Chlamydia screening, Cholesterol screening (cardiac), LDL cholesterol testing (diabetes), eye exams (diabetes), HbA1c testing, nephropathy screening	Cholesterol management, HbA1c control, LDL cholesterol control, blood pressure control	9/4
Burgers et al. 2010[55]	Survey, 8973 patients, Range	Range of settings	Chronic lung, mental health, hypertension, heart disease, diabetes, arthritis, cancer	P	Coordination of care and overall experience (Commonwealth Fund International Health Policy Survey)	Morbidity score	Morbidity score	None	1/0
Kaplan et al. 1989 [25]	Randomised control trial, 252 patients, US	Range of settings	Ulcer disease, hypertension, diabetes, breast cancer	P	Physician-patient communication (Assessment of audio tape and questionnaire)	Physiologic measures taken at visit and patients' self-rated health status survey.	Follow up blood glucose and blood pressure, functional health status, self reported health status.	None	4/0
Jha et al. 2008 [23]	Cross-sectional study, 2429 settings, US	Hospital	Acute myocardial infarction, congestive heart failure, pneumonia complications from surgery	O	Patient communication with clinicians, experience of nursing services, discharge planning (Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey)	Technical quality of care using Hospital Quality Alliance (HQA) score	Technical quality of care in AMI, CHF, pneumonia, surgical care	None	4/0

Rao et al. 2006 [47]	Cross sectional study, 3487 patients, UK	Primary care	Hypertension, Influenza vaccination	P	Older patients' experience of technical quality of care (General Practice Assessment survey)	Technical quality of care - (medical records)	None	Hypertension monitoring and control, influenza vaccination.	0/3
Meterko et al. 2010 [26]	Cohort study, 1858 patients, US	Veteran Affairs Medical Centres	Acute myocardial infarction	P	Patient-centred care, access, courtesy, information, coordination, patient preferences, emotional support, family involvement, physical comfort (VA Survey of Healthcare Experiences of Patients (SHEP))	Survival 1-year post discharge	Survival 1-year post discharge	None	1/0
Vincent et al. 1994 [56]	Cohort Survey 227 patients, UK	Range of settings	Varied	P	Accountability, explanation, standards of care, compensation (Questionnaire)	Legal action	Legal action	None	1/0
Agoritsas et al. 2005 [57]	Cohort patient survey, 1518 patients, Switzerland	Hospital	Varied	P	Global rating of care and respect and dignity questions (Picker survey)	Patient reports of undesirable events (survey)	Neglect of important information by health care staff, pain control, needless repetition of a test, being handled with roughness	None	4/0
Flocke et al. 1998 [37]	Cross-sectional study, 2889 patients, US	Primary care	Varied	P	Interpersonal communication, physician's knowledge of patient, coordination (Components of Primary Care Instrument (CPCI))	Use of preventive care services (screening, health habit counselling services, immunization services)	Screening, health habit counselling, immunization	None	3/0
Jackson, J. et al. 2001 [58]	Quantitative Cohort study 500 patients, US	General medicine walk-in clinic	Varied	P	Patient satisfaction (RAND 9-item survey)	Functional status (Medical Outcomes Study Short-Form Health Survey [SF-6]), symptom resolution, (RAND 9-item survey), follow-up visits	Symptom resolution, repeat visits, functional status	None	3/0

Clark et al. 2007 [41]	Randomized control trial 731 patients, US	Range of settings	Asthma	P	Patient experience of physician communication (Patient interviews and Likert Scale)	Emergency department visits, hospitalizations, office phone calls and visits, urgent office visits (Survey + Medical chart review of 6% of patients to verify responses)	Number of office visits, emergency visits, urgent office visits, phone calls, hospitalizations	None	5/0
Raiz et al. 1999 [20]	Quantitative Cohort Study, 357 patients, US	Primary care	Renal transplant	P	Patient faith in doctor (Multidimensional Health Locus of Control Scale (MHLC))	Medication compliance	Remembering medications, taking medications as prescribed	None	2/0
Kahn et al. 2007 [32]	Cohort study, 881 patients, US	Hospitals	Breast cancer	P	Level of physician support, participation in decision-making and information on side effects (Survey)	Medication adherence	Ongoing tamoxifen use	None	1/0
Plomondon et al. 2008 [22]	Cohort study, 1815 patients, US	Hospital	Myocardial infarction	P	Satisfaction with explanations from their doctor, overall satisfaction with treatment (Seattle Angina questionnaire)	Presence of angina (Seattle Angina Questionnaire)	Presence of angina	None	1/0
Fuertes et al. 2008 [19]	Survey, 152 patients, US	Hospital	Neurology	P	Physician–patient communication, Physician–Patient Working Alliance, Empathy, Multicultural Competence (Questionnaire)	Adherence to medical treatment (Adherence Self-Efficacy Scale and Medical Outcome Study (MOS) Adherence Scale)	Adherence to treatment	None	1/0
Lewis et al. 2010 [31]	Qualitative cohort study, 191 patients, US	Primary care	Pain	P	Doctor–Patient Communication (Survey)	Medication adherence (Prescription Drug Use Questionnaire (PDUQ))	Use of Prescribed Opioid Medications	None	1/0
Safran et al. 1998 [59]	Cross-sectional study, 7204 patients, US	Primary care	Varied	P	Accessibility, continuity, integration, clinical interaction, interpersonal aspects, trust (The Primary Care Assessment Survey)	Adherence to physician's advice, health status, health outcomes (Medical Outcomes Study (MOS), Behavioural Risk Factor Survey)	Adherence, health status	Health outcomes	2/1

Alamo et al. 2002 [60]	Randomized study, 81, Spain	Primary care	Chronic musculoskeletal pain (CMP), fibromyalgia	P	Patient centered-care ('Gatha-Res questionnaire' and follow-up phone call)	Pain (Visual Analogue Scale (VAS) anxiety (Oldberg scale of anxiety and depression (GHQ))	Anxiety, number of tender points (pain)	Pain, pain intensity, pain as a problem, number of associated symptoms, depression, physical mobility, social isolation, emotional reaction, sleep	2/10
Fan et al. 2005 [61]	Survey, 21689 patients, US	Primary care	Cardiac care, diabetes, COPD	P	Communication skills and humanistic qualities of primary care physician (Seattle Outpatient Satisfaction Survey)	Physical and emotional aspects, coping ability and symptom burden for angina, COPD and diabetes (Seattle Angina Questionnaire (SAQ), Obstructive Lung Disease Questionnaire (SOLDQ), Diabetes Questionnaire (SDQ))	Patient ability to deal with all 3 diseases, education for diabetes patients, angina stability, physical limitation due to angina	Self-reported physical limitation for angina and COPD, symptom burden for diabetes, complications for diabetes	7/4
O'Malley et al. 2004 [38]	Cross-sectional study, 961 patients, US	Primary care	Varied	P	Patient trust (Survey)	Use of preventive care services	Blood pressure measurement , height and weight measurement, cholesterol check, pap tests, breast cancer screening, colorectal cancer screening, discussion of diet, discussion on depression	None	8/0
Little et al. 2001 [62]	Survey, 865 patients, UK	Primary care	varied	P	Patient centredness (Survey)	Enablement, symptom burden, resource use	Enablement, symptom burden, referrals	Re-attendance, investigations	3/2
Levinson et al. 1997 [63]	Qualitative cohort study, 124 physicians, US	Primary care	Varied	P	Physician-patient communication (Assessment of audiotape)	Malpractice	Malpractice claims	None	1/0

Carcaise-Edinboro & Bradley 2008 [39]	Cross sectional study, 8488 patients, US	Primary care	Colorectal cancer	P	Patient-provider communication (Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey)	Colorectal Cancer screening, fecal occult blood testing, and colonoscopy (Medical Expenditure Panel Survey)	CRC screening, fecal occult blood testing, colonoscopy	None	3/0
Schneider et al. 2004 [33]	Cross-sectional analysis study, 554 patients, US	Primary care	HIV	P	Physician-patient relationship (Survey)	Adherence (Survey)	Adherence to antiretroviral therapy	None	1/0
Schoenthaler et al. 2008 [34]	Cross-sectional study, 439 patients, US	Primary care	Hypertension	P	Patients' perceptions of providers' communication (Survey)	Medication adherence (Morisky self-report measure)	Medication adherence	None	1/0
Slatore et al. 2010 [64]	Cross sectional study, 342 patients, US	Range of settings	COPD	P	Patient-clinician communication (Quality of communication questionnaire (QOC))	Self-reported breathing problem confidence, and general self-rated health (Survey)	Confidence in dealing with breathing problems	Self-rated health	1/1
Lee & Lin 2009 [65]	Cohort study, 480 patients, Taiwan	Range of settings	Type 2 diabetes	P	Trust in physicians (Survey)	Self-efficacy, adherence, health outcomes (Multidimensional Diabetes Questionnaire and 12-Item Short-Form Health Survey (SF-12))	Physical HRQoL, mental HRQoL, body mass index HbA1c, triglycerides, complications, self-efficacy, outcome expectations, adherence	None	9/0
Heisler et al. 2002 [35]	Survey, 1314 patients, US	primary care	Diabetes	P	Physician communication, physician interaction styles, participatory decision making (Questionnaire)	Disease management (Surveys and national databases)	Overall self-management, diabetes diet, medication compliance, exercise, blood glucose monitoring, foot care.	Exercise	6/1
Lee & Lin 2010 [66]	Cohort study, 614 patients, Taiwan	Range of settings	Type 2 diabetes	P	Patients' perceptions of support, autonomy, trust, satisfaction (Health Care Climate Questionnaire and Autonomy Preference Index (API))	Glycosylated hemoglobin (HbA1C) (medical records) Physical and mental health-related qality of life (HRQoL) (SF-12)	Physical HRQoL, mental HRQoL	Information preference interaction, HbA1C	2/2

Kennedy A. et al. 2003 [67]	Randomised control trial, 700 patients, UK	Hospital	Inflammatory bowel Disease	P	Patient centered-care (Interviews)	Resource use, self-rated physical and mental health, enablement (Patient diaries, questionnaires, medical records)	Ability to cope with condition, symptom relapses, hospital visits, appointments made	Physical functioning, role limitations, social functioning, mental health, energy/vitality, pain, general health perception, anxiety, number of relapses, number of medically-defined relapses, average relapse duration, frequency of GP visits, delay before starting treatment	4/13
Stewart et al. 2000 [42]	Observational Cohort study, 315 patients, Canada	Primary care	General	P	Patient-centred communication (Assessment of audiotape and Patient-Centered Communication Score tool)	Discomfort (VAS) symptom severity severity (Visual Analogue Scale), Health Status (Short Form-36 SF-36) Quality of care provision (Chart review by doctors)	Symptom discomfort & concern, self-reported health, diagnostic tests, referrals, and visits to the family physician	None	5/2
Kinnersley et al. 1999 [68]	Observational Study, 143 patients, UK	Primary care	Varied	P	Patient-centredness (Assessment of audiotape and questionnaires)	Symptom resolution, resolution of concerns, functional health status (Questionnaire)	None	Resolution of symptoms, resolution of concerns, functional health status	0/3
Solberg et al. 2008 [51]	Survey, 3109 patients, US	Primary care - multispecialty group	Varied	P	Patient experience of errors (Survey)	Review of errors (Chart audits and physician reviewer judgements)	None	None	1/0

Isaac et al. 2010 [46]	Cross-sectional study, 927 hospitals, US	Hospital	Acute myocardial infarction, congestive heart failure, pneumonia complications from surgery.	O	General patient experiences (Hospital Consumer Assessment of Healthcare Providers and Systems survey (HCAHPS))	Processes of care (Health Quality Alliance (HQA) database) and Patient Safety Indicators	Decubitus ulcer rates, infections, processes of care for pneumonia, CHF and myocardial infarctions, surgical composites, hemorrage, respiratory failure, DVT, pulmonary embolism, sepsis	Failure to rescue	11/1
Glickman et al. 2010 [27]	Cohort Study, 3562 patients, US	Hospital	Acute myocardial infarction	P	Patient satisfaction (Press-Ganey survey)	Adherence to practice guidelines, outcomes (CRUSADE quality improvement registry).	Inpatient mortality, composite clinical measures, AMI survival	None	3/0
Fremont et al. 2001[69]	Survey, 1346 patients, US	Hospital	Cardiac	P	Patient centred care (Picker survey)	Processes of care, functional health status, cardiac symptoms (Medical Outcomes Study questionnaire, London School of Hygiene measures for cardiac symptoms)	Overall health, chest pain, patient reported general physical and mental health status	Mental health, shortness of breath	5/2
Riley et al. 2007 [70]	Survey, 506 patients, Canada	Hospital	Cardiac care - acute coronary	P	Continuity of care (The Heart Continuity of Care Questionnaire, Medical Outcome Study Social Support Survey, Illness Perception Questionnaire)	Participation in cardiac rehabilitation, perception of illness, functional capacity (Duke Activity Status Index (DASI))	Cardiac rehabilitation participation, perceptions of illness consequences	None	2/0
Weingart et al. 2005 [49]	Cohort study, 228 patients, US	Hospital	Varied	P	Patient experience of adverse events (Interviews)	Adverse events (Medical records and patient interviews)	Adverse events	None	1/0
Weissman et al. 2008 [50]	Survey, 998 patients, US	Hospital	Varied	P	Patient experience of adverse events (Interviews)	Adverse events (Medical records)	Adverse events	None	1/0

Table 7: Systematic reviews

Authors	Timespan & studies meeting inclusion criteria	Health care setting	Disease areas covered	Unit of analysis	Patient experience focus (and measurement methods)	Safety & effectiveness measure - association demonstrated -	Safety & effectiveness measure - association NOT demonstrated	Assocs found vs not found
Blasi et al. 2001 [71]	1974-1998, 4 out of 25	Range of settings	Asthma, hypertension, cancer, insomnia, menopause, obesity, tonsillitis	P	Provider behaviour and communication (Grading of consultations)	Health status, symptom improvement, treatment effectiveness, fear of injection, anxiety, ratings of pain, number of doctor visits, pain, speed of recovery	Comfort, recovery time, return visits	9/3
Drotar 2009 [29]	1998-2008, 4 out of 22	Range of settings	Asthma, cystic fibrosis, diabetes, epilepsy, inflammatory bowel disease, juvenile rheumatoid arthritis	P	Physician and staff behaviour (Surveys, interviews, medical records)	Treatment adherence, compliance, office visits, phone calls, hospitalizations	Medication adherence	5/1
Hall et al. 2010 [72]	1990-2009, 10 out of 14	Range of settings	Brain injury, musculoskeletal conditions, cardiac conditions, trauma, back, neck and shoulder pain	P	Therapist-patient relationship, therapeutic alliance (Surveys, audio/video taped session)	Adherence, employment status, physical training, therapeutic success, perceived effect of treatment, pain, physical function, depression, general health status, attendance, floor-bench lifts, global assessment scores, ability to perform ADLs, mobility	Weekly physical training, disability, productivity, depression, functional status, adherence	18/6
Stevenson et al. 2004 [73]	1991-2000, 7 out of 134	Range of settings	Hypertension, asthma, chronic obstructive pulmonary disorder, ovarian cancer, epilepsy, hyperlipidaemia	P	Doctor-patient communication (Surveys)	Self-reported adherence, blood pressure control, GP practice visits, hospitalizations, emergency room visits for children with asthma, quality of life for COPD patients, oral contraceptive adherence, adherence to anti-epileptic drugs, pain control following gynaecological surgery, adherence to medication for depression	Length of visits to doctor for asthma patients, health status and use of health care services for epilepsy patients, adherence to Niacin and bile acid sequestrant therapy	9/5

Saultz & Lochner 2005 [44]	1967-2002, 41 studies	Range of settings	Varied	P	Continuity of care -ongoing relationship between individual doctor &patient (Surveys, continuity of care index)	Hospitalization rate, hospital readmission, length of stay, influenza immunization, preventive care, antibiotic compliance, ICU days, Neonatal morbidity, Apgar score, Birth weight, Rates and timeliness of childhood immunizations, health-related quality of life, recommended diabetes care measures, glucose control, PAP tests, mammogram rate, breast exams, surgical operation rates, hypertension control, presence of depression, relationship problems, adverse events in hospitalized patients, degree of patient enablement, rheumatic fever incidence	Diabetes (HbA1C, lipid control, blood pressure control, presence of diabetic complications), blood glucose control, functional ability of elderly patients, compliance with antibiotic therapy, well-child visits, blood pressure checks in women, pregnancy complications, newborn mortality, immunization rates, NICU admissions, Apgar scores, caesarean rate, length of labor, indications for tonsillectomy	51/30
Hall & Roter & Katz 1988 [74]	Meta-analysis 41 studies	Range of settings	Varied	P	Clinician-patient communication (Surveys, interviews, observations, assessment of video or audio)	Compliance (with 4 variables of PE), recall/understanding (with 4 variables of PE)	Compliance (with 1 variable of PE), recall/understanding (with 1 variable of PE)	8/2
Jackson, C. et al. 2010 [40]	1984-2008, 3 out of 17	Range of settings	Inflammatory bowel disease	P	Trust in physician, Patient-physician agreement, adequacy information (Surveys)	Adherence to treatment	Compliance	2/1
Sans-Coralles et al. 2006 [43]	1984-2005, 9 out of 20	Primary care	No specific disease focus	P	Continuity of care, coordination of care, consultation time, doctor-patient relationship (Validated tools in these different domains)	Hospital admissions, length of stay, compliance, recovery from discomfort, emotional health, diagnostic tests, referrals, quality of care for asthma, diabetes and angina, symptom burden, receipt of preventive services	Enablement	13/1
Hsiao & Boult 2008 [45]	1984-2003, 3 out of 14	Primary care	No specific disease focus	P	Continuity with physician (Surveys, interviews, medical records, chart reviews)	Hospitalisations for all conditions and ambulatory care-sensitive conditions, odds of hospitalisation(2), health care costs(2), emergency department visits, emergent hospital admissions(2), length of stay, diabetes recognition, mental health(2), pain, perception of health, well-being, BMI, triglyceride concentrations, recovery, clinical outcomes, self-reported health	Acute ambulatory care-sensitive conditions, mobility, pain, emotion, activities of daily living, smoking, BMI, hypertension, hypercholesterolemia, self-reported health, glycemic control, diabetes control, frequency of hypoglycemic reactions, blood sugar, weight	21/15

Arbuthnott et al. 2009 [30]	Meta analysis, 1955-2007, All 48 studies included	Range of settings	Asthma, bacterial infection, fibromyalgia, diabetes, renal disease, hypertension, congestive heart failure, inflammatory bowel disease, breast cancer, HIV, and tuberculosis	P	Physician–patient collaboration (Observation, surveys)	Medication adherence, behavioural adherence	Appointment adherence	2/1
Stewart 1995 [75]	1983-1993, 21 studies	Range of settings	Peptic ulcers, breast cancer, diabetes, hypertension, headache, coronary artery disease, gingivitis, tuberculosis, prostate cancer	P	Physician-patient communication (Surveys, evaluation of audio- or videotape recording)	Peptic ulcer physical limitation, blood glucose levels, blood pressure, headache resolution, physician evaluation of symptom resolution for coronary artery disease, gingivitis and tuberculosis, anxiety level in gynecological care, radiation therapy, breast cancer care, functional status following radiation therapy for prostate cancer, anxiety after radiation therapy, pain levels and hospital length of stay after intra-abdominal surgery, physical and psychological complaints in breast cancer care	Details not included	16/5
Zolnierek & DiMatteo 2009 [28]	Meta analysis 1949-2008, 127 studies	Range of settings	No specific disease focus	P	Physician-patient communication (Observation, surveys)	Adherence to treatment recommended by clinician	Adherence (2 observational studies)	125/2
Beck et al. 2002 [76]	1975-2000, 5 out of 14	Primary care	No specific disease focus	P	Physician-patient communication (Observation, evaluation of audio and video tapes)	Compliance with doctors' advice, blood pressure, pill count	None	10/0
Cabana & Lee 2004 [21]	1966-2002, 7 out of 18	Range of settings	Rheumatoid arthritis, epilepsy, breast cancer, cervical cancer, diabetes	P	Continuity of care (Validated measures of continuity e.g. SCOC)	Hospitalizations, length of stay, emergency department visits, intensive care days, preventive medicine visits, drug or alcohol abuse, outpatient attendance, glucose control for adults with diabetes	None	18/5
Richards et al. 2006 [77]	1997-2002, 2 out of 33	Range of settings	Psoriasis	P	Patient's perception of care, satisfaction, interpersonal skills (Surveys, interviews)	Treatment adherence, medication use	None	2/0

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Title	A review of evidence on the links between patient experience and clinical safety and effectiveness
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Abstract

Objective: To explore evidence on the links between patient experience and clinical safety and effectiveness outcomes.

Design: Systematic review

Setting: A wide range of settings within primary and secondary care including hospitals and primary care centres.

Participants: A wide range of demographic groups and age groups.

Primary and secondary outcome measures: A broad range of patient safety and clinical effectiveness outcomes including mortality, physical symptoms, length of stay and adherence to treatment.

Results: This study, summarizing evidence from 55 studies, indicates consistent positive associations between patient experience, patient safety and clinical effectiveness for a wide range of disease areas, settings, outcome measures and study designs. It demonstrates positive associations between patient experience and self-rated and objectively measured health outcomes; adherence to recommended clinical practice and medication; preventive care (such as health-promoting behavior, use of screening services and immunization); and resource use (such as hospitalization, length of stay and primary care visits). There is some evidence of positive associations between patient experience and measures of the technical quality of care and adverse events. Overall it was more common to find positive associations between patient experience and patient safety and clinical effectiveness than no associations.

Conclusion: The data presented show positive associations between patient experience and clinical effectiveness and patient safety and supports the case for the inclusion of patient experience as one of the central pillars of quality in health care. It supports the argument that the three dimensions of quality should be looked at as a group and not in isolation. Clinicians should resist sidelining patient experience as too subjective or mood-orientated, divorced from the 'real' clinical work of measuring safety and effectiveness.

Trial registration: This review was not registered.

Article Summary

Article focus:

- Should patient experience, as advocated by the Institute of Medicine and the NHS Outcomes Framework, be seen as one of the pillars of quality in health care alongside patient safety and clinical effectiveness?
- What aspects of patient experience can be linked to clinical effectiveness and patient safety outcomes?
- What evidence is available on the links between patient experience and clinical effectiveness and patient safety outcomes?

Key Messages:

- The results show that patient experience is consistently positively associated with patient safety and clinical effectiveness across a wide range of disease areas, study designs, settings, population groups and outcome measures.
- Patient experience is positively associated with: self-rated and objectively measured health outcomes; adherence to recommended medication and treatments; preventative care such as use of screening services and immunizations; healthcare resource use such as hospitalization and primary care visits; technical quality of care delivery and adverse events.
- This study supports the argument that patient experience, clinical effectiveness and patient safety are linked and should be looked at as a group.

Strengths and limitations of this study:

- This study demonstrates an approach to designing a systematic review for the 'catch-all' term patient experience, and brings together evidence from a variety of sources that may otherwise remain dispersed.
- This was a time-limited review and there is scope to expand this search based on the results and broaden the search terms to uncover further evidence.

Introduction

Patient experience is increasingly recognized as one of the three pillars of quality in healthcare alongside clinical effectiveness and patient safety. [1] In the NHS the measurement of patient experience data to identify strengths and weaknesses of health care delivery, drive quality improvement, inform commissioning and promote patient choice is now mandatory.[2 3 4] In addition to data on harm avoidance or success rates for treatments, providers are now assessed on aspects of care such as dignity and respect, compassion and involvement in care decisions. [4] In England these data are published in Quality Accounts and the Commissioning for Quality & Innovation (CQUINs) payment framework which makes a proportion of care providers' income conditional on improvement in this domain. [5]

The inclusion of patient experience as a pillar of quality is often justified on the grounds of its intrinsic value – that the expectation of humane, empathic care is a given and requires no further justification. It is also justified on more utilitarian grounds as a means of improving patient safety and clinical effectiveness. [6 7] For example, clear information, empathic, two-way communication and respect for patients' beliefs and concerns could lead to patients being more informed and involved in decision making and create an environment where patients are more willing to disclose information. Patients could have more 'ownership' of clinical decisions, entering a 'therapeutic alliance' with clinicians. This could support improved and more timely diagnosis, clinical decisions and advice and lead to fewer unnecessary referrals or diagnostic tests.[8 9] Increased patient agency can encourage greater participation in personal care, compliance with medication, adherence to recommended treatment, and monitoring of prescriptions and dose.[9 10] Patients can be informed about what to expect from treatment and be motivated to report adverse events or complications and keep a list of their medical histories, allergies, and current medications. [11]

Patients' direct experience of care process through clinical encounters or as an observer (for example, as a patient on a hospital ward) can provide valuable insights into everyday care. Examples include attention to pain control, assistance with bathing or help with feeding, the environment (cleanliness, noise, physical safety) and coordination of care between professions or organizations. Given the organizational fragmentation of much of healthcare and the numerous services with which many patients interact, the measurement of patient experience may help provide a 'whole system' perspective not readily available from more discrete patient safety and clinical effectiveness measures.[11]

Focusing on such utilitarian arguments, this study reviews evidence on links that have been demonstrated between patient experience and clinical effectiveness and patient safety.

Methods

Identifying variables relevant to patient experience

Patient experience is a term that encapsulates a number of dimensions and in preliminary database searches this phrase on its own uncovered a limited number of useful studies. To broaden and structure the search for evidence, identify search terms and provide a framework for analysis it was necessary to identify what patient experience entails and outline potential mechanisms through which it is proposed to impact on safety and effectiveness. As such, we combined common elements from patient experience frameworks produced by The Institute of Medicine[1], Picker Institute[12] and NICE. [13]

Table 1 delineates different dimensions of patient experience and distinguishes between 'relational' and 'functional' aspects. [10 14] Relational aspects refer to interpersonal aspects of care – the ability of clinicians to empathise, respect the preferences of patients, include them in decision making and

provide information to enable self-care.[10] It also refers to patients' expectations that professionals will put their interest above other considerations and be honest and transparent when something goes wrong. [8 15] Functional aspects relate to basic expectations about how care is delivered, such as attention to physical needs, timeliness of care, clean and safe environments, effective coordination between professionals and continuity.

Table 1: Identifying aspects of patient experience and search terms

Relational aspects	Functional aspects
Emotional and psychological support, relieving fear and anxiety, treated with respect, kindness, dignity, compassion, understanding Participation of patient in decisions and respect and understanding for beliefs, values, concerns, preferences and their understanding of their condition Involvement of, and support for family and carers in decisions Clear, comprehensible information and communication tailored to patient needs to support informed decisions (awareness of available options, risks and benefits of treatments) and enable self-care Transparency, honesty, disclosure when something goes wrong	Effective treatment delivered by trusted professionals Timely, tailored and expert management of physical symptoms Attention to physical support needs and environmental needs (e.g. clean, safe, comfortable environment) Coordination and continuity of care; smooth transitions from one setting to another

Using these frameworks and discursive documents in this area of research [10 16 17 9] as a guide we identified words and phrases commonly used to denote aspects of patient experience, examples of which are listed in Table 2.

Table 2: Search terms denoting patient experience:
patient-centred care; patient engagement; clinical interaction; patient-clinician; clinician-patient; patient-doctor; doctor-patient; physician-patient; patient-physician; patient-provider; interpersonal treatment; physician discussion; trust in physician; empathy; compassion; respect; responsiveness; patient preferences; shared decision making; therapeutic alliance; participation in decisions; decision making; autonomy; caring; kindness; dignity; honesty; participation; right to decide; physical comfort; involvement (of family, carers, friends); emotional support; continuity (of care); smooth transition; emotional support;

These were combined with search terms representing patient safety and clinical effectiveness outcomes hypothesized to be associated with patient experience in discursive literature. We searched for a broad range of outcome measures, including both self-rated and 'objective' measurements of health status, physical and mental health and wellbeing, the use of preventive health services, compliance or adherence to health-promoting behavior and resource use.

Combining these two sets of search terms in the EMBASE database, we identified 5323 papers whose abstracts were then reviewed. If deemed relevant the full article was retrieved to assess whether it met the inclusion criteria.

(REVISED TEXT) Given concerns about the sole use of protocol-driven search strategies for complex evidence,[18] for the full text articles retrieved for review, we used a 'snowballing' approach to identify further studies. This involved sourcing further articles in these studies for assessment and using the 'related articles' function in the PubMED database. We repeated this for new articles identified until the approach ceased to identify new studies.

Inclusion criteria, assessment of quality and categorisation of evidence

We included studies that measured associations between patients' reporting of their experience and patient safety and clinical effectiveness outcomes. These included studies measuring associations between patient experience and safety or effectiveness outcomes either at a patient level (i.e data on both types of variables for the same patients) or at an organizational level (i.e. associations between aggregated measures of patient experience and safety and effectiveness outcomes for the same type of organisation such as a hospital or primary care practice).

We included studies where the variables denoting patient experience and patient safety and clinical effectiveness were measured in a credible way, through the use of validated tools. For patient experience variables these include surveys covering several aspects of experience (such as Picker Surveys and the Hospital Consumer Assessment of Healthcare Providers and Systems survey) and specific aspects (such as a 'Working Alliance Scale'[19] , Multidimensional Health Locus of Control Scale (MHLC) scale[20] or Usual Provider Continuity (UPC) index[21]). For patient safety and clinical effectiveness these include, for example, generic health and quality of life surveys (such as Short-Form 36 (SF36)), disease-specific surveys (such as the Seattle Angina Questionnaire[22]), measures of the technical quality of care (such as the Hospital Quality Alliance (HQA) score), reviews of medical records and care provider data.[23] Details of the methods used to measure variables in each study are included in Tables 6 and 7.

We included studies where the sample size of patients or organizations appeared sufficiently large to conduct meaningful statistical analysis (excluding studies with fewer than 50 subjects). When extracting data relevant to our study from systematic reviews we selected only those studies that met these criteria.

(REVISED TEXT) We then searched the studies' results for positive associations (where a better patient experience is associated with safer or more effective care), negative associations (where a better patient experience is associated with less safe or less effective care) and no associations. Associations refer to cases where one measure of patient experience (typically an overall rating of patient experience for a care provider) has a statistically significant association with one or more clinical effectiveness or patient safety variable. If a study showed associations between several aspects of patient experience that appeared to be closely related (for example, 'listening', 'empathy', or 'respect') and an aspect of effectiveness or safety, this was counted as one association found. This was to avoid exaggerating the weight of the evidence by 'over counting' associations.

Two main types of studies emerged in the search – those focusing on interventions to improve aspects of patient experience and those exploring associations between patient experience variables and patient safety and clinical effectiveness variables. To manage the scope of this time-limited review we decided to restrict analysis of the large number of interventions to the evidence contained within systematic reviews.

Results

Overall, the evidence indicates positive associations between patient experience and patient safety and clinical effectiveness that appear consistent across a range of disease areas, study designs, settings, population groups and outcome measures. Positive associations found outweigh 'no associations' by 429 to 127. Of the four studies where 'no associations' outweigh positive associations there is no suggestion that these are methodologically superior. (REVISED TEXT) Negative associations were rare. Of the 40 individual studies assessed in Table 6 negative associations (between patient experience of clinical team interactions and continuity of care and separate assessment of the quality of clinical care) were found in only one study.[24]

Table 3 shows surveys to be the predominant method used to measure variables for individual studies.

Table 3: Methods used to measure variables

	No of studies
Patient experience variables	
Survey	31
Interviews	2
Medical records	1
Effectiveness & safety variables	
Survey for self-rated healthcare	12
Other survey	14
Medical records	3
Data monitoring quality of care delivery (e.g. audit, HQA, HEDIS)	3
Care provider outcome data	3
Physical examination	1
Patient interviews	2

Chart 1 outlines the disease areas covered. **(Chart 1 inserted here)**

Table 4 presents the frequency of positive associations and 'no associations' categorized by type of outcomes (for 378 of the 556 cases where sufficient information was available to categorise). These include; objectively measured health outcomes (for example, 'mortality', 'blood glucose levels',

'infections', 'medical errors'); self-reported health and wellbeing outcomes (for example, 'health status', 'functional ability' 'quality of life', 'anxiety'); adherence to recommended treatment and use of preventive care services likely to improve health outcomes (for example, 'medication compliance', 'adherence to treatment' and screening for a variety of conditions); outcomes related to healthcare resource use (for example 'hospitalizations', 'hospital readmission', 'emergency department use', 'primary care visits'); errors or adverse events and measures of the technical quality of care.

Table 4: Associations categorised by type of outcome

	Objective' health outcomes	Self-reported health and wellbeing	Adherence to treatment (including medication)	Preventive care	Healthcare resource use	Adverse events	Technical quality of care	All categories
No. of positive associations found	29	61	152	24	31	7	8	312
'No associations'	11	36	7	2	6	0	4	66

Table 5 shows associations categorised by type of care provider (for the subset of studies focusing on one setting) and for studies focused on chronic conditions.

Table 5: Weight of evidence by provider and for chronic conditions

Weight of evidence by provider and for chronic conditions	Associations found	No associations
Primary care	110	48
Hospital	43	17
Chronic conditions	53	9

Tables 6 and 7 present details of all studies identified, specifying the analytical focus of each study, methods to measure variables and positive associations and 'no asscoiations' found.

Discussion

Overall, the evidence indicates associations between patient experience, clinical effectiveness and patient safety that appear consistent across a range of disease areas, study designs and settings.

As Table 4 indicates, the evidence shows positive associations found outweigh those not found for both self-assessment of physical and mental health (61 vs 36) and 'objective' measures of health outcomes (e.g. where measures are taken by a clinician or by reviewing medical records) (29 vs 11). For objective measures, one study [25] shows positive associations for ulcer disease, hypertension and breast cancer. Two studies on myocardial infarction show positive associations with survival one year after discharge [26] and inpatient mortality. [27] Objective measurement is less frequently explored than self-rated health and is an area that could benefit from further research.

Evidence is strong in the case of adherence to recommended medical treatment. A meta-analysis included in this study showed positive associations between the quality of clinician-patient communications and adherence to medical treatment in 125 out of 127 studies analysed and showed the odds of patient adherence was 1.62 times higher where physicians had communication training.[28] Regarding compliance with medication, positive associations found outweigh those not found. [20 29-35] A review of interventions to increase adherence to medication (not included in this study) showed communication of information, good provider-patient relationships and patients' agreement with the need for treatment as common determinants of effectiveness. [36] There is evidence of better use of preventive services, such as screening services in diabetes, colorectal, breast and cervical cancer; cholesterol testing and immunization. [24 25 37-39] There is also evidence of impacts on resource use of primary and secondary care (such as hospitalizations, readmissions and primary care visits). [21 29 40-45]

For studies exploring associations between patient experience and technical quality of care measured by other means, the evidence is mixed. Two studies in acute care showed positive associations between overall ratings of patient experience and ratings of the technical quality of care (using Hospital Quality Alliance (HQA) measures) for myocardial infarction, congestive heart failure, pneumonia and complications from surgery. [23 46] Another found an association with adherence to clinical guidelines for acute myocardial infarction.[27] A similar study in primary care found positive associations between patient experience of processes and measurement of care quality (from the HEDIS system measuring care quality for disease prevention and management in chronic conditions). [24] However, two other studies found no associations between patients' ratings and ratings based on an assessment of medical records.[47 48]

Some studies show positive associations between patients' perspective or observations of processes of care and the safety of care recorded through other means. Isaac [46] found positive associations between ratings of patient experience and six patient safety indicators (decubitus ulcer; failure to rescue; infections due to medical care; postoperative hemorrhage, respiratory failure, pulmonary embolism and sepsis). Two studies examining evidence for patients' ability to identify medical errors or adverse events in hospital showed positive associations between patients' accounts of their experience of adverse events and the documentation of events in medical records.[49 50] But another study shows only 2% of patient-reported errors were classified by medical reviewers as 'real clinical medical errors' with most 'reclassified' by clinicians as 'misunderstandings' or 'behaviour or communication problems'.[51] Overall there is less evidence available on safety compared to effectiveness and this should be a priority for future research in this area.

Research from other studies not included in this review support these findings. For example, research on 'decision aids' to ensure patients are well informed about their treatments and that decisions reflect the preferences of patients indicates that patient engagement has a beneficial impact on outcomes. For example, awareness of the risks of surgical procedures resulted in a 23% reduction in surgical interventions and better functional status. [52] Another review showed that provision of good information and emotional support are associated with better recovery from surgery and heart attacks. [53]

Study strengths and limitations

This review builds on other studies[9 10 16 17] exploring links between these three domains. This study also demonstrates an approach to designing a systematic search for evidence for the 'catch-all' term patient experience, bringing together evidence from a variety of sources that may otherwise remain dispersed. This approach can be used or adapted for further research in this area.

This was a time-limited review and there is scope to expand this search based on our results. There may be scope to broaden the search terms and this may uncover further evidence. The first search was confined to one database and the review focused primarily on peer-reviewed literature excluding gray literature. To manage the scope of this review we restricted the analysis of interventions to improve patient experience to evidence within systematic reviews. NEW TEXT While we used some quality criteria to filter studies (including the use of validated tools to measure experience, safety and effectiveness outcomes and sample size), with more time a more detailed formal quality assessment may have added value to the study. Although all positive associations included in the study are statistically significant, the strength of associations vary. Due to time constraints and the heterogeneity of measures used we did not systematically compare the strengths of positive associations in different studies but this may be an area for future work. NEW TEXT There may also be scope to explore whether future research in this area could go beyond the counting of associations in this study through, for example, meta-analysis. As always, there may be a publication bias in favour of studies showing positive associations between patient experience variables and safety and effectiveness outcomes.[54] In addition, 28 of the 40 individual studies assessed were conducted in the United States and caution is needed about their applicability to other healthcare systems.

(*Next 3 paragraphs replaced with a reworded conclusion below*

Although there are areas that would benefit from further research, the data presented supports the view that patient experience data, robustly collected and analysed, may highlight strengths and risks in effectiveness and safety and that focusing on improving patient experience will increase the likelihood of improvements in the other two domains. There are aspects of patient experience that will help to explain performance in safety and effectiveness and vice-versa.

Conclusion

The evidence suggests that attention to these various dimensions of patient-centred care outlined in Table 1 may result in important clinical benefits and more effective use of health care resources, particularly for chronic conditions, where most healthcare resources are consumed. There is also some evidence to suggest that patients can be used as partners in identifying poor and unsafe practice and help enhance quality and safety.

This supports the argument that the three measures should be looked at as a group and not in isolation. Clinicians should resist sidelining patient experience measures as too subjective or mood-orientated, divorced from the 'real' clinical work of measuring and delivering safety and effectiveness.

Conclusion

(REVISED CONCLUSION) The inclusion of patient experience as one of the pillars of quality is partly justified on the grounds that patient experience data, robustly collected and analyzed, may help highlight strengths and weaknesses in effectiveness and safety and that focusing on improving patient experience will increase the likelihood of improvements in the other two domains.[3]

The evidence collated in this study demonstrates positive associations between patient experience and the other two domains of quality. Because associations do not entail causality, this does not necessarily prove that improvements in patient experience will cause improvements in the other two domains. However, the weight of evidence across different areas of healthcare indicates that patient experience is clinically important. There is also some evidence to suggest that patients can be used as partners in identifying poor and unsafe practice and help enhance effectiveness and safety. This supports the argument that the three dimensions of quality should be looked at as a group and not in isolation. Clinicians should resist sidelining patient experience measures as too

subjective or mood-orientated, divorced from the 'real' clinical work of measuring and delivering patient safety and clinical effectiveness.

Table 6: Individual studies

Author	Type of study, sample size, country	Setting	Disease focus	Unit of analysis (Patient (P) or org (O)	Patient experience focus and method used -	Safety & effectiveness measure -	Association demonstrated	Association NOT demonstrated	Assoc. Found vs NOT found
Chang et al. 2006[48]	Cohort study, 236 patients, US	Managed care organisation	22 clinical conditions	P	Providers communication (The Consumer Assessment of Healthcare Providers and Systems survey and 'Quality of care')	Technical quality and patient global ratings (Medical records and patient interviews)	None	Technical quality of care	0/1
Sequist et al. 2008[24]	Cross-sectional study, 492 settings, US	Primary care	Cervical, breast and colorectal cancer, chlamydia, cardiovascular conditions, asthma, diabetes	P	Doctor-patient communication, clinical team interactions, organizational features of care (The Ambulatory Care Experiences Survey)	Clinical quality focusing on disease prevention, disease management and outcomes of care (Healthcare Effectiveness Data and Information Set (HEDIS))	Cervical cancer, breast cancer and colorectal cancer screening, Chlamydia screening, Cholesterol screening (cardiac), LDL cholesterol testing (diabetes), eye exams (diabetes), HbA1c testing, nephropathy screening	Cholesterol management, HbA1c control, LDL cholesterol control, blood pressure control	9/4
Burgers et al. 2010[55]	Survey, 8973 patients, Range	Range of settings	Chronic lung, mental health, hypertension, heart disease, diabetes, arthritis, cancer	P	Coordination of care and overall experience (Commonwealth Fund International Health Policy Survey)	Morbidity score	Morbidity score	None	1/0
Kaplan et al. 1989 [25]	Randomised control trial, 252 patients, US	Range of settings	Ulcer disease, hypertension, diabetes, breast cancer	P	Physician-patient communication (Assessment of audio tape and questionnaire)	Physiologic measures taken at visit and patients' self-rated health status survey.	Follow up blood glucose and blood pressure, functional health status, self reported health status.	None	4/0
Jha et al. 2008 [23]	Cross-sectional study, 2429 settings, US	Hospital	Acute myocardial infarction, congestive heart failure, pneumonia complications from surgery	O	Patient communication with clinicians, experience of nursing services, discharge planning (Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey)	Technical quality of care using Hospital Quality Alliance (HQA) score	Technical quality of care in AMI, CHF, pneumonia, surgical care	None	4/0

Rao et al. 2006 [47]	Cross sectional study, 3487 patients, UK	Primary care	Hypertension, Influenza vaccination	P	Older patients' experience of technical quality of care (General Practice Assessment survey)	Technical quality of care - (medical records)	None	Hypertension monitoring and control, influenza vaccination.	0/3
Meterko et al. 2010 [26]	Cohort study, 1858 patients, US	Veteran Affairs Medical Centres	Acute myocardial infarction	P	Patient-centred care, access, courtesy, information, coordination, patient preferences, emotional support, family involvement, physical comfort (VA Survey of Healthcare Experiences of Patients (SHEP))	Survival 1-year post discharge	Survival 1-year post discharge	None	1/0
Vincent et al. 1994 [56]	Cohort Survey 227 patients, UK	Range of settings	Varied	P	Accountability, explanation, standards of care, compensation (Questionnaire)	Legal action	Legal action	None	1/0
Agoritsas et al. 2005 [57]	Cohort patient survey, 1518 patients, Switzerland	Hospital	Varied	P	Global rating of care and respect and dignity questions (Picker survey)	Patient reports of undesirable events (survey)	Neglect of important information by health care staff, pain control, needless repetition of a test, being handled with roughness	None	4/0
Flocke et al. 1998 [37]	Cross-sectional study, 2889 patients, US	Primary care	Varied	P	Interpersonal communication, physician's knowledge of patient, coordination (Components of Primary Care Instrument (CPCI))	Use of preventive care services (screening, health habit counselling services, immunization services)	Screening, health habit counselling, immunization	None	3/0
Jackson, J. et al. 2001 [58]	Quantitative Cohort study 500 patients, US	General medicine walk-in clinic	Varied	P	Patient satisfaction (RAND 9-item survey)	Functional status (Medical Outcomes Study Short-Form Health Survey [SF-6]), symptom resolution, (RAND 9-item survey), follow-up visits	Symptom resolution, repeat visits, functional status	None	3/0

Clark et al. 2007 [41]	Randomized control trial 731 patients, US	Range of settings	Asthma	P	Patient experience of physician communication (Patient interviews and Likert Scale)	Emergency department visits, hospitalizations, office phone calls and visits, urgent office visits (Survey + Medical chart review of 6% of patients to verify responses)	Number of office visits, emergency visits, urgent office visits, phone calls, hospitalizations	None	5/0
Raiz et al. 1999 [20]	Quantitative Cohort Study, 357 patients, US	Primary care	Renal transplant	P	Patient faith in doctor (Multidimensional Health Locus of Control Scale (MHLC))	Medication compliance	Remembering medications, taking medications as prescribed	None	2/0
Kahn et al. 2007 [32]	Cohort study, 881 patients, US	Hospitals	Breast cancer	P	Level of physician support, participation in decision-making and information on side effects (Survey)	Medication adherence	Ongoing tamoxifen use	None	1/0
Plomondon et al. 2008 [22]	Cohort study, 1815 patients, US	Hospital	Myocardial infarction	P	Satisfaction with explanations from their doctor, overall satisfaction with treatment (Seattle Angina questionnaire)	Presence of angina (Seattle Angina Questionnaire)	Presence of angina	None	1/0
Fuertes et al. 2008 [19]	Survey, 152 patients, US	Hospital	Neurology	P	Physician–patient communication, Physician–Patient Working Alliance, Empathy, Multicultural Competence (Questionnaire)	Adherence to medical treatment (Adherence Self-Efficacy Scale and Medical Outcome Study (MOS) Adherence Scale)	Adherence to treatment	None	1/0
Lewis et al. 2010 [31]	Qualitative cohort study, 191 patients, US	Primary care	Pain	P	Doctor–Patient Communication (Survey)	Medication adherence (Prescription Drug Use Questionnaire (PDUQ))	Use of Prescribed Opioid Medications	None	1/0
Safran et al. 1998 [59]	Cross-sectional study, 7204 patients, US	Primary care	Varied	P	Accessibility, continuity, integration, clinical interaction, interpersonal aspects, trust (The Primary Care Assessment Survey)	Adherence to physician's advice, health status, health outcomes (Medical Outcomes Study (MOS), Behavioural Risk Factor Survey)	Adherence, health status	Health outcomes	2/1

Alamo et al. 2002 [60]	Randomized study, 81, Spain	Primary care	Chronic musculoskeletal pain (CMP), fibromyalgia	P	Patient centered-care ('Gatha-Res questionnaire' and follow-up phone call)	Pain (Visual Analogue Scale (VAS) anxiety (Oldberg scale of anxiety and depression (GHQ))	Anxiety, number of tender points (pain)	Pain, pain intensity, pain as a problem, number of associated symptoms, depression, physical mobility, social isolation, emotional reaction, sleep	2/10
Fan et al. 2005 [61]	Survey, 21689 patients, US	Primary care	Cardiac care, diabetes, COPD	P	Communication skills and humanistic qualities of primary care physician (Seattle Outpatient Satisfaction Survey)	Physical and emotional aspects, coping ability and symptom burden for angina, COPD and diabetes (Seattle Angina Questionnaire (SAQ), Obstructive Lung Disease Questionnaire (SOLDQ), Diabetes Questionnaire (SDQ))	Patient ability to deal with all 3 diseases, education for diabetes patients, angina stability, physical limitation due to angina	Self-reported physical limitation for angina and COPD, symptom burden for diabetes, complications for diabetes	7/4
O'Malley et al. 2004 [38]	Cross-sectional study, 961 patients, US	Primary care	Varied	P	Patient trust (Survey)	Use of preventive care services	Blood pressure measurement , height and weight measurement, cholesterol check, pap tests, breast cancer screening, colorectal cancer screening, discussion of diet, discussion on depression	None	8/0
Little et al. 2001 [62]	Survey, 865 patients, UK	Primary care	varied	P	Patient centredness (Survey)	Enablement, symptom burden, resource use	Enablement, symptom burden, referrals	Re-attendance, investigations	3/2
Levinson et al. 1997 [63]	Qualitative cohort study, 124 physicians, US	Primary care	Varied	P	Physician-patient communication (Assessment of audiotape)	Malpractice	Malpractice claims	None	1/0

Carcaise-Edinboro & Bradley 2008 [39]	Cross sectional study, 8488 patients, US	Primary care	Colorectal cancer	P	Patient-provider communication (Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey)	Colorectal Cancer screening, fecal occult blood testing, and colonoscopy (Medical Expenditure Panel Survey)	CRC screening, fecal occult blood testing, colonoscopy	None	3/0
Schneider et al. 2004 [33]	Cross-sectional analysis study, 554 patients, US	Primary care	HIV	P	Physician-patient relationship (Survey)	Adherence (Survey)	Adherence to antiretroviral therapy	None	1/0
Schoenthaler et al. 2008 [34]	Cross-sectional study, 439 patients, US	Primary care	Hypertension	P	Patients' perceptions of providers' communication (Survey)	Medication adherence (Morisky self-report measure)	Medication adherence	None	1/0
Slatore et al. 2010 [64]	Cross sectional study, 342 patients, US	Range of settings	COPD	P	Patient-clinician communication (Quality of communication questionnaire (QOC))	Self-reported breathing problem confidence, and general self-rated health (Survey)	Confidence in dealing with breathing problems	Self-rated health	1/1
Lee & Lin 2009 [65]	Cohort study, 480 patients, Taiwan	Range of settings	Type 2 diabetes	P	Trust in physicians (Survey)	Self-efficacy, adherence, health outcomes (Multidimensional Diabetes Questionnaire and 12-Item Short-Form Health Survey (SF-12))	Physical HRQoL, mental HRQoL, body mass index HbA1c, triglycerides, complications, self-efficacy, outcome expectations, adherence	None	9/0
Heisler et al. 2002 [35]	Survey, 1314 patients, US	primary care	Diabetes	P	Physician communication, physician interaction styles, participatory decision making (Questionnaire)	Disease management (Surveys and national databases)	Overall self-management, diabetes diet, medication compliance, exercise, blood glucose monitoring, foot care.	Exercise	6/1
Lee & Lin 2010 [66]	Cohort study, 614 patients, Taiwan	Range of settings	Type 2 diabetes	P	Patients' perceptions of support, autonomy, trust, satisfaction (Health Care Climate Questionnaire and Autonomy Preference Index (API))	Glycosylated hemoglobin (HbA1C) (medical records) Physical and mental health-related qality of life (HRQoL) (SF-12)	Physical HRQoL, mental HRQoL	Information preference interaction, HbA1C	2/2

Kennedy A. et al. 2003 [67]	Randomised control trial, 700 patients, UK	Hospital	Inflammatory bowel Disease	P	Patient centered-care (Interviews)	Resource use, self-rated physical and mental health, enablement (Patient diaries, questionnaires, medical records)	Ability to cope with condition, symptom relapses, hospital visits, appointments made	Physical functioning, role limitations, social functioning, mental health, energy/vitality, pain, general health perception, anxiety, number of relapses, number of medically-defined relapses, average relapse duration, frequency of GP visits, delay before starting treatment	4/13
Stewart et al. 2000 [42]	Observational Cohort study, 315 patients, Canada	Primary care	General	P	Patient-centred communication (Assessment of audiotape and Patient-Centered Communication Score tool)	Discomfort (VAS) symptom severity severity (Visual Analogue Scale), Health Status (Short Form-36 SF-36) Quality of care provision (Chart review by doctors)	Symptom discomfort & concern, self-reported health, diagnostic tests, referrals, and visits to the family physician	None	5/2
Kinnersley et al. 1999 [68]	Observational Study, 143 patients, UK	Primary care	Varied	P	Patient-centredness (Assessment of audiotape and questionnaires)	Symptom resolution, resolution of concerns, functional health status (Questionnaire)	None	Resolution of symptoms, resolution of concerns, functional health status	0/3
Solberg et al. 2008 [51]	Survey, 3109 patients, US	Primary care - multispecialty group	Varied	P	Patient experience of errors (Survey)	Review of errors (Chart audits and physician reviewer judgements)	None	None	1/0

Isaac et al. 2010 [46]	Cross-sectional study, 927 hospitals, US	Hospital	Acute myocardial infarction, congestive heart failure, pneumonia complications from surgery.	O	General patient experiences (Hospital Consumer Assessment of Healthcare Providers and Systems survey (HCAHPS))	Processes of care (Health Quality Alliance (HQA) database) and Patient Safety Indicators	Decubitus ulcer rates, infections, processes of care for pneumonia, CHF and myocardial infarctions, surgical composites, hemorrage, respiratory failure, DVT, pulmonary embolism, sepsis	Failure to rescue	11/1
Glickman et al. 2010 [27]	Cohort Study, 3562 patients, US	Hospital	Acute myocardial infarction	P	Patient satisfaction (Press-Ganey survey)	Adherence to practice guidelines, outcomes (CRUSADE quality improvement registry).	Inpatient mortality, composite clinical measures, AMI survival	None	3/0
Fremont et al. 2001[69]	Survey, 1346 patients, US	Hospital	Cardiac	P	Patient centred care (Picker survey)	Processes of care, functional health status, cardiac symptoms (Medical Outcomes Study questionnaire, London School of Hygiene measures for cardiac symptoms)	Overall health, chest pain, patient reported general physical and mental health status	Mental health, shortness of breath	5/2
Riley et al. 2007 [70]	Survey, 506 patients, Canada	Hospital	Cardiac care - acute coronary	P	Continuity of care (The Heart Continuity of Care Questionnaire, Medical Outcome Study Social Support Survey, Illness Perception Questionnaire)	Participation in cardiac rehabilitation, perception of illness, functional capacity (Duke Activity Status Index (DASI))	Cardiac rehabilitation participation, perceptions of illness consequences	None	2/0
Weingart et al. 2005 [49]	Cohort study, 228 patients, US	Hospital	Varied	P	Patient experience of adverse events (Interviews)	Adverse events (Medical records and patient interviews)	Adverse events	None	1/0
Weissman et al. 2008 [50]	Survey, 998 patients, US	Hospital	Varied	P	Patient experience of adverse events (Interviews)	Adverse events (Medical records)	Adverse events	None	1/0

Table 7: Systematic reviews

Authors	Timespan & studies meeting inclusion criteria	Health care setting	Disease areas covered	Unit of analysis	Patient experience focus (and measurement methods)	Safety & effectiveness measure - association demonstrated -	Safety & effectiveness measure - association NOT demonstrated	Assocs found vs not found
Blasi et al. 2001 [71]	1974-1998, 4 out of 25	Range of settings	Asthma, hypertension, cancer, insomnia, menopause, obesity, tonsillitis	P	Provider behaviour and communication (Grading of consultations)	Health status, symptom improvement, treatment effectiveness, fear of injection, anxiety, ratings of pain, number of doctor visits, pain, speed of recovery	Comfort, recovery time, return visits	9/3
Drotar 2009 [29]	1998-2008, 4 out of 22	Range of settings	Asthma, cystic fibrosis, diabetes, epilepsy, inflammatory bowel disease, juvenile rheumatoid arthritis	P	Physician and staff behaviour (Surveys, interviews, medical records)	Treatment adherence, compliance, office visits, phone calls, hospitalizations	Medication adherence	5/1
Hall et al. 2010 [72]	1990-2009, 10 out of 14	Range of settings	Brain injury, musculoskeletal conditions, cardiac conditions, trauma, back, neck and shoulder pain	P	Therapist-patient relationship, therapeutic alliance (Surveys, audio/video taped session)	Adherence, employment status, physical training, therapeutic success, perceived effect of treatment, pain, physical function, depression, general health status, attendance, floor-bench lifts, global assessment scores, ability to perform ADLs, mobility	Weekly physical training, disability, productivity, depression, functional status, adherence	18/6
Stevenson et al. 2004 [73]	1991-2000, 7 out of 134	Range of settings	Hypertension, asthma, chronic obstructive pulmonary disorder, ovarian cancer, epilepsy, hyperlipidaemia	P	Doctor-patient communication (Surveys)	Self-reported adherence, blood pressure control, GP practice visits, hospitalizations, emergency room visits for children with asthma, quality of life for COPD patients, oral contraceptive adherence, adherence to anti-epileptic drugs, pain control following gynaecological surgery, adherence to medication for depression	Length of visits to doctor for asthma patients, health status and use of health care services for epilepsy patients, adherence to Niacin and bile acid sequestrant therapy	9/5

Saultz & Lochner 2005 [44]	1967-2002, 41 studies	Range of settings	Varied	P	Continuity of care -ongoing relationship between individual doctor &patient (Surveys, continuity of care index)	Hospitalization rate, hospital readmission, length of stay, influenza immunization, preventive care, antibiotic compliance, ICU days, Neonatal morbidity, Apgar score, Birth weight, Rates and timeliness of childhood immunizations, health-related quality of life, recommended diabetes care measures, glucose control, PAP tests, mammogram rate, breast exams, surgical operation rates, hypertension control, presence of depression, relationship problems, adverse events in hospitalized patients, degree of patient enablement, rheumatic fever incidence	Diabetes (HbA1C, lipid control, blood pressure control, presence of diabetic complications), blood glucose control, functional ability of elderly patients, compliance with antibiotic therapy, well-child visits, blood pressure checks in women, pregnancy complications, newborn mortality, immunization rates, NICU admissions, Apgar scores, caesarean rate, length of labor, indications for tonsillectomy	51/30
Hall & Roter & Katz 1988 [74]	Meta-analysis 41 studies	Range of settings	Varied	P	Clinician-patient communication (Surveys, interviews, observations, assessment of video or audio)	Compliance (with 4 variables of PE), recall/understanding (with 4 variables of PE)	Compliance (with 1 variable of PE), recall/understanding (with 1 variable of PE)	8/2
Jackson, C. et al. 2010 [40]	1984-2008, 3 out of 17	Range of settings	Inflammatory bowel disease	P	Trust in physician, Patient-physician agreement, adequacy information (Surveys)	Adherence to treatment	Compliance	2/1
Sans-Coralles et al. 2006 [43]	1984-2005, 9 out of 20	Primary care	No specific disease focus	P	Continuity of care, coordination of care, consultation time, doctor-patient relationship (Validated tools in these different domains)	Hospital admissions, length of stay, compliance, recovery from discomfort, emotional health, diagnostic tests, referrals, quality of care for asthma, diabetes and angina, symptom burden, receipt of preventive services	Enablement	13/1
Hsiao & Boult 2008 [45]	1984-2003, 3 out of 14	Primary care	No specific disease focus	P	Continuity with physician (Surveys, interviews, medical records, chart reviews)	Hospitalisations for all conditions and ambulatory care-sensitive conditions, odds of hospitalisation(2), health care costs(2), emergency department visits, emergent hospital admissions(2), length of stay, diabetes recognition, mental health(2), pain, perception of health, well-being, BMI, triglyceride concentrations, recovery, clinical outcomes, self-reported health	Acute ambulatory care-sensitive conditions, mobility, pain, emotion, activities of daily living, smoking, BMI, hypertension, hypercholesterolemia, self-reported health, glycemic control, diabetes control, frequency of hypoglycemic reactions, blood sugar, weight	21/15

Arbuthnott et al. 2009 [30]	Meta analysis, 1955-2007, All 48 studies included	Range of settings	Asthma, bacterial infection, fibromyalgia, diabetes, renal disease, hypertension, congestive heart failure, inflammatory bowel disease, breast cancer, HIV, and tuberculosis	P	Physician–patient collaboration (Observation, surveys)	Medication adherence, behavioural adherence	Appointment adherence	2/1
Stewart 1995 [75]	1983-1993, 21 studies	Range of settings	Peptic ulcers, breast cancer, diabetes, hypertension, headache, coronary artery disease, gingivitis, tuberculosis, prostate cancer	P	Physician-patient communication (Surveys, evaluation of audio- or videotape recording)	Peptic ulcer physical limitation, blood glucose levels, blood pressure, headache resolution, physician evaluation of symptom resolution for coronary artery disease, gingivitis and tuberculosis, anxiety level in gynecological care, radiation therapy, breast cancer care, functional status following radiation therapy for prostate cancer, anxiety after radiation therapy, pain levels and hospital length of stay after intra-abdominal surgery, physical and psychological complaints in breast cancer care	Details not included	16/5
Zolnierek & DiMatteo 2009 [28]	Meta analysis 1949-2008, 127 studies	Range of settings	No specific disease focus	P	Physician-patient communication (Observation, surveys)	Adherence to treatment recommended by clinician	Adherence (2 observational studies)	125/2
Beck et al. 2002 [76]	1975-2000, 5 out of 14	Primary care	No specific disease focus	P	Physician-patient communication (Observation, evaluation of audio and video tapes)	Compliance with doctors' advice, blood pressure, pill count	None	10/0
Cabana & Lee 2004 [21]	1966-2002, 7 out of 18	Range of settings	Rheumatoid arthritis, epilepsy, breast cancer, cervical cancer, diabetes	P	Continuity of care (Validated measures of continuity e.g. SCOC)	Hospitalizations, length of stay, emergency department visits, intensive care days, preventive medicine visits, drug or alcohol abuse, outpatient attendance, glucose control for adults with diabetes	None	18/5
Richards et al. 2006 [77]	1997-2002, 2 out of 33	Range of settings	Psoriasis	P	Patient's perception of care, satisfaction, interpersonal skills (Surveys, interviews)	Treatment adherence, medication use	None	2/0

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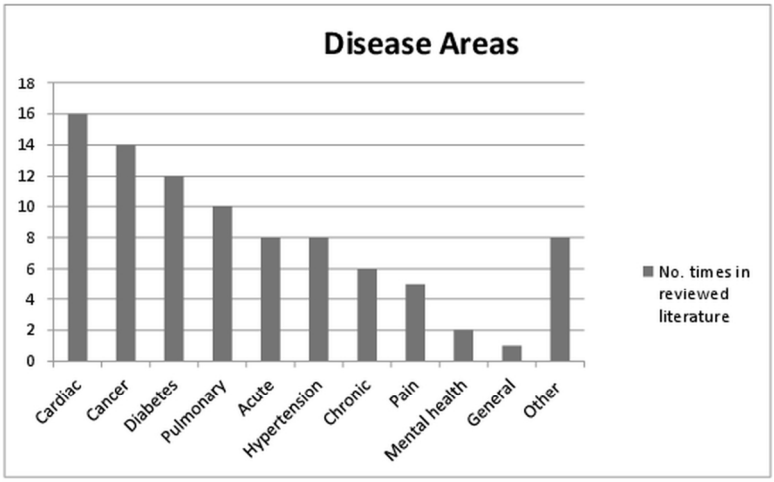
Chart 1: Disease areas covered



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PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	n/a
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5-6
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4-6
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	4-6
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	4-6
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4-6
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6,12-19
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	n/a
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	n/a

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	10
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	n/a
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	3-6
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	12-19
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	10
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	12-21
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	n/a
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	10
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	n/a
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	7-8
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	10
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	10
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	1

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

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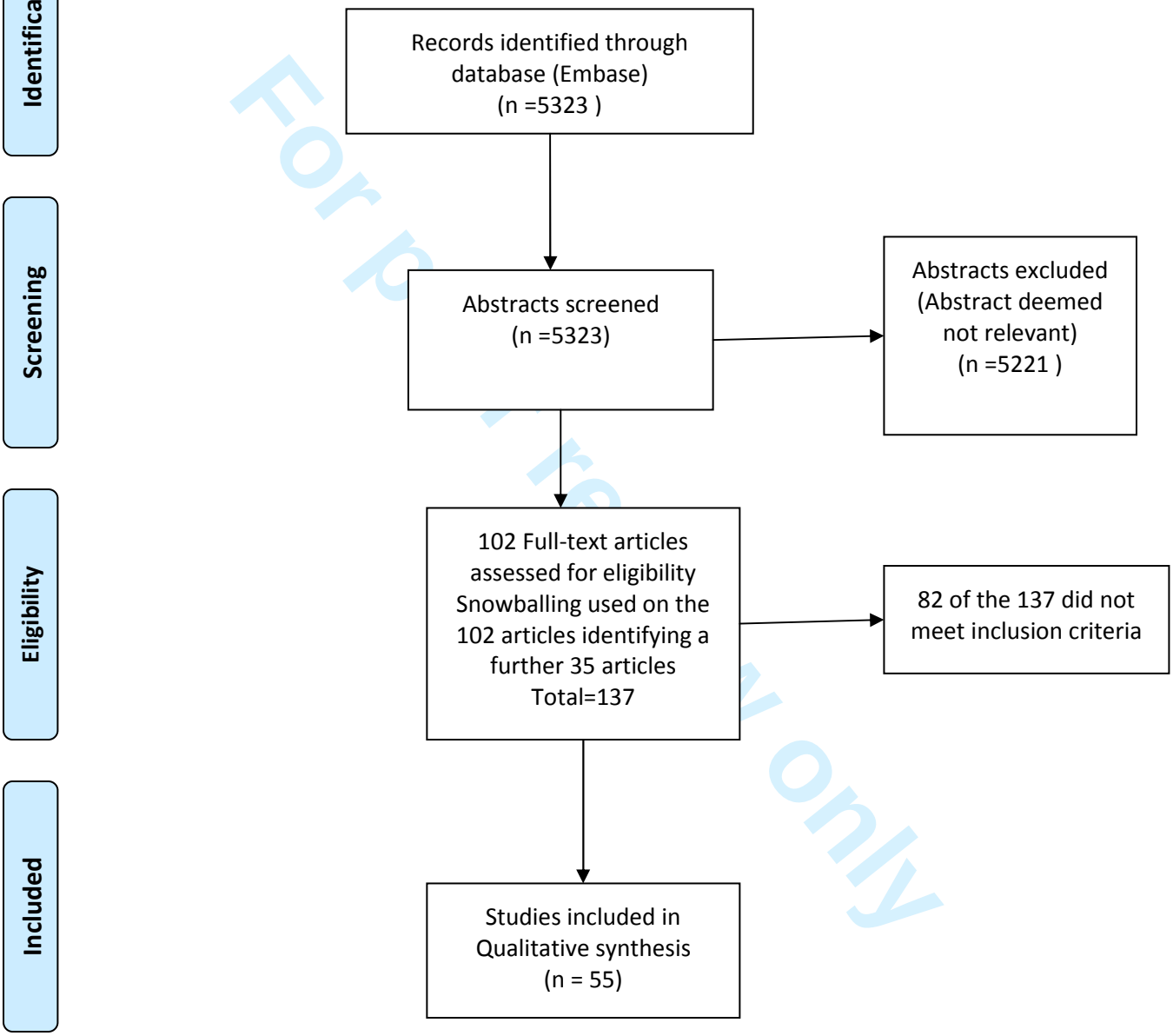
PRISMA 2009 Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

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