Online patient feedback: a scoping review and stakeholder consultation

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Abstract

Objective: To provide a synthesis of the current evidence base of online patient feedback using a scoping review and a consultation of stakeholders in England, UK.

Methods: We searched MEDLINE, EMBASE, PsycINFO, CINAHL and the Social Science Citation Index and conducted hand searches up to January 2018. We included primary studies of internet-based reviews and other online feedback (e.g. from social media and blogs), from patients, carers or the public, about health care providers (individuals, services or organisations). Key findings were extracted and tabulated for further synthesis guided by the themes arising from a stakeholder consultation.

Results: The review found that awareness and usage of online feedback is increasing. Most feedback is about physicians, and is typically positive. Online reviews and ratings are used by some service users to inform choice of provider or treatment while providers tend to be concerned about the validity and representativeness of feedback. Reviewed studies found that those who post feedback are generally not representative of the general population, tending to be younger and more educated, but online feedback does broadly correlate with some other measures of health care quality.

Conclusion: In an increasingly digital society, where citizens provide and use feedback for a range of goods and services, online patient feedback can offer a convenient, low cost, and widely accessible mechanism to capture experiences of health care, while obviously being mindful to avoid issues of digital exclusion. This review provides important insights to inform policy development seeking to harness the opportunities offered by online feedback.

Funding

Background

Patient experience and satisfaction data are routinely collected by health services in many countries to ensure the delivery of patient-centred care; to monitor patient safety; to improve quality in service delivery and care; and/or to aid patients in choosing services or providers.

Incorporating patient experience data into the monitoring and delivery of health care is associated with a range of potential benefits,[1] including increased patient-centeredness, satisfaction, quality improvement and cost-effectiveness.

Increasingly, patient feedback is being collected online, mirroring common practices in other industries. Previous reviews of the evidence in this emerging field showed that the use of rating sites online is increasing, that they have the potential to provide information about patients' views on quality of care and that their value to policymakers should be explored.[2, 3]

Online patient feedback offers an opportunity for collecting experience, satisfaction and improvement data in addition to the more traditional approach that uses paper-based or digitised experience or satisfaction surveys. Providing multiple and inclusive avenues for feedback is important. The internet offers advantages to patients and providers in that it is convenient, low-cost, accessible to most, immediate and transparent. In England, the Care Quality Commission, the independent regulator of all health and social care services, invited websites that collect patient feedback to share it as '*a vital part of its monitoring inspection activities*'. However, the health care sector in general has been slow to adopt this practice routinely in the way other industries have, and guidance on the collection and implementation of online patient feedback is scant. This scoping study brings together existing research in this area, alongside views of key stakeholders. It aims to provide a state-of-the-art snapshot of this emerging field to inform policy and practice and to set the agenda for future research. Stakeholders consulted for this work were based in England so their views are pertinent to the English NHS. However, the review itself covers the international evidence.

Method

We used a scoping review as the topic was broad and we aimed to include studies of multiple designs, following Arksey and O'Malley.[6] We defined online patient feedback as qualitative (e.g. narrative) or quantitative (e.g. star/numeric ratings) information in any format which describe the experience of using a health service by a patient or carer in an online setting, whether solicited or unsolicited.

Search strategy

MEDLINE, EMBASE, PsycINFO, CINAHL and the Social Science Citation Index were searched in January 2017 using a list of terms likely to retrieve articles about online patient feedback compiled in consultation with an information specialist. The search was updated in 2018 (see Online Supplement for the detailed search strategy).

Inclusion criteria

Original primary research on online feedback (provider reviews, ratings and other online feedback, e.g. on social media/blogs) from patients, carers or the public about health care providers (individuals/organisations) and published 2000-2018, from any discipline or design.

Screening and data extraction

Titles and abstracts and then full-texts were screened independently by two reviewers. Disagreements were resolved with a third reviewer. Selected full-text articles were randomly assigned to either of two reviewers and data on authors, publication date, study aims, sample, methods and findings were extracted and tabulated.

Analysis

Included studies were thematically grouped by aim for further analysis. Findings were synthesised using a narrative approach including individual analysis and discussion within the research team,

guided by the themes that arose from the stakeholder consultation (see below). Formal critical appraisal was not conducted due to the broad and inclusive nature of this review and the variation in study designs.

Stakeholder consultation

We approached organisations with experience of (collecting or using) online feedback, including feedback companies in the health and retail sectors, national health policymakers, regulators of health services, senior clinicians working in the area of patient experience, and patient experience managers from NHS organisations, as well as service users with experience of reading and providing feedback, who were known to the research team through Patient and Public Involvement work (service-user as used here includes patients, family, carers, and those who use services but are not ill, e.g. pregnant women). Potential participants were invited by email to take part in the consultation; the email also explained the practicalities of participating and what topics would be covered. All invited stakeholders accepted the invitation; some participants were already known to the project team and had previously expressed interest. The consultation sought to inform the questions being asked in the literature review and therefore did not require formal ethics approval. Each stakeholder was consulted by the lead author (AMB) about their views, key concerns and future priorities, either in-person or by telephone using a broad interview schedule and conversations typically lasted 60-90 minutes. Topics included how online feedback was defined, how feedback is collected and used in commercial and health settings, what feedback is for and how and why is it collected, used and analysed in the NHS, the usefulness of numeric and narrative data, and inclusion and diversity. Notes were taken and analysed inductively by the research team.

Results

The literature searches yielded a total of 28,613 records; the total number of included studies was 78, of which 12 were identified through hand-searching (Figure 1). A table summarising the included papers can be found in Appendix 1. The majority of included studies were conducted in the USA,

followed by the UK and Germany, with a smaller number of studies from China, the Netherlands, Canada and Austria.

[Figure 1 about here]

The analysis of the stakeholder consultation identified six overarching evidence gaps that would need to be addressed to help policymakers navigate the online patient feedback landscape (see also Box 1 for more detail on the stakeholders' views): Who provides and who uses feedback? How do organisations currently use feedback? What is the content of online feedback? Why is online feedback given? What are staff and services user attitudes towards online feedback? How reliable is online feedback? We address each of these evidence gaps raised by the stakeholders in turn using the literature found in the scoping review.

[Box 1 about here]

Who provides and who uses online feedback?

The review found that awareness of rating sites varies, that providing an online review is a minority activity, and that frequency of use has increased over time. A public survey in Germany noted that 32% of respondents were aware of rating and review sites.[7] Awareness of such sites tends to be lower than for those for consumer goods, with a representative survey of the US population finding that respondents considered such sites less important than other sources of information (e.g. recommendations of friends and family).[8] The frequency of posting a rating varied across included studies. One survey of an online panel in Germany found that 11% of respondents had posted feedback online[9] while a survey of a representative sample of the population in the UK reported that 8% of respondents had done so[10], with studies from the USA and Austria reporting figures of around 6% .[11] [12] Women were found to be more likely to post online feedback.[13, 14]

The survey of the UK population mentioned above found that 42% of respondents reported reading online health reviews; it also noted that the only significant association with providing feedback was

being a more frequent internet user.[10] One nationally representative survey in the USA found

parents to be frequent users; they would use review sites to choose doctors for their children.[11]

Other users are likely to be younger people, with higher levels of education[14], and those with a long-

term condition.[14, 15] One small survey of adults in London, UK, found that being of the same gender

as their general practitioner (GP), feeling listened to and perceiving the relationship with their GP as

friendly seem to be potential predictors of use of rating sites, whereas willingness to use such sites

was predicted by patients' autonomy in health care decisions.[16]Having clear explanations from a GP

meant patients were less likely to use such sites.

How do organisations currently use feedback?

The scoping review did not identify studies that considered the role or function of online patient

feedback, or uncovered the practices and processes governing its use in health care organisations.

One study in Germany found that physicians have begun to respond to online reviews[17], and a

survey of providers by the same authors reported that ophthalmologists and gynaecologists were

the most likely to implement change based on online experiences.[18] One Dutch study highlighted the

potential value of online feedback for regulatory supervision although the health care inspectors

interviewed expressed reservations about online patient feedback.[19] An analysis of different forms

of online feedback in the Netherlands further noted that structured patient feedback websites

contained more relevant additional information than social media sites (e.g. Facebook, Twitter) and

the authors [20] argued for the use of the former by health care inspectors because dedicated patient

feedback websites were seen as providing 'on the ground' or 'bottom-up' quality monitoring by

patients.

What is the content of online feedback?

Characteristics of feedback

The literature consistently showed that the majority of feedback was positive and ratings for health care providers were generally high[13, 21-23]; service user reviews often recommend the health service to others.[22, 24] An analysis of ratings of dentists on a German physician rating website found that female or older patients and those who had private health insurance were more likely to give positive feedback, but the reason for this was unclear.[21] Patients who had a long-standing relationship with their doctor were also more likely to provide positive feedback.[25]

Online feedback is usually relatively succinct. A sentiment analysis (an automated process of identifying, quantifying and studying information in text that is often used to analyse consumer reviews) of 33,654 reviews of 12,898 medical practitioners in the New York State area noted that they contained on average 4.17 sentences per review and 15.5% contained only one line.[26] An analysis of narrative comments posted on a German physician rating website reported that longer narratives were more likely to be negative.[13]

Patient feedback was usually positive but reviews also highlighted negative aspects of the care experience.[28] The feedback in the included studies largely pertained to services or providers, clinical and administrative staff, and the physical environment. The content of feedback often related specifically to physicians and focused on perceived knowledge and competency[29, 30], patient-centred communication[29, 30], personal character traits[25, 30, 31], professional conduct[30], dignified care[22] and coordination of care.[25] Waiting times and length of appointments were also discussed[22, 31, 32], with other themes including cleanliness[22, 33], scheduling appointments[33], insurance[32], access[25], administrative staff[25, 32] and parking.[34] Studies did not report patients commenting on medical or clinical aspects of their care. However, one study noted that including reviews from family members increased the amount of patient safety information contained therein.[27]

Who is reviewed?

Analyses of physician rating sites in Germany found that male physicians were more likely to be reviewed than females, with female physicians more likely to receive positive feedback than their

male colleagues.[9, 21] Online feedback typically concerns physicians; feedback on nurses and allied health professionals appears to be neglected in the current literature.

Some specialities (e.g. otolaryngology) appear to be under-represented on rating sites and some sub-specialities received a higher number of reviews than others.[23] Surgeons in the US appear to be among the most frequently rated health professionals with one study showing that 97% in California had been rated on at least one patient feedback website.[35]

Why is online feedback given and how is it used?

Included studies reported that people use online feedback sites to post reviews or ratings or consult them to aid choosing a doctor or other health professionals, e.g. dentist.[7, 8, 11, 12, 15] In a national representative US survey, 28% of respondents had used such websites to search for a physician[11], while in an online panel survey in German survey 25% of respondents had done so.[7] That study also found that 65% of its 1505 respondents had chosen a doctor informed by the website rating while 52% did not consult a specific doctor based on online ratings. A cross-sectional survey of a representative sample of the UK population showed that most people provide feedback to help other patients and to express positive experiences (praise), and that they read it to find out about tests or treatments and to help choose a treatment or provider.[10]

There has been little qualitative work exploring the motivations to post (and read) online reviews. In a qualitative study of patients' views on giving online feedback and ratings to general practitioners (GPs) in England, study participants did not consider feedback necessary and questioned whether GPs would use it. They noted that they would only do so if they had an extremely positive or extremely negative experience.[36] The study also reported that some participants would provide online feedback because this could be done remotely, that feedback can be shared with others and because they believed it would be taken seriously by GPs. Others however raised issues of accessibility, were concerned about privacy and security, and thought online feedback might be ignored. Similarly, a cross-sectional survey of people who had used physician rating websites in

Germany found that having had a very positive or negative experience would motivate them to post feedback whereas concerns such as possible negative consequences, technical issues or concerns about site operators would stop them from doing so.[37]

A nationally representative survey of the US population reported that of those who had used rating sites in the preceding year, 35% said that good ratings had helped them select a physician while roughly the same proportion (37%) said that poor ratings led them to not consult the physician in question.[8] An experimental study of 500 adults recruited through a crowdsourcing website who were presented with a hypothetical review of a physician (without any other information about quality or performance), showed that predominantly negative reviews reduced the willingness of participants to consult the physician; willingness was also lower when negative reviews were presented before positive reviews.[38]

The perceived trustworthiness, credibility and expertise of the reviewer, and the content of the review were also found to be important to patients reading feedback. For example, a randomized experiment with 168 adults found that respondents preferred fact-oriented content over emotional feedback (i.e. containing slang or humour).[12] An online survey of a random sample of patients in Germany noted that prior use of a rating site increased the likelihood of rating a health care experience in the future[14], while a similar survey in the USA reported that patients are likely to spend more time on sites that contain patient comments but that this reduced their attention to other standardised measures of quality, increasing the potential for making ill-informed choices .[39]

What are health professionals and services user attitudes towards online feedback?

Health professionals described a range of reservations about online feedback, while patients' attitudes were more mixed. For example, a qualitative interview study with GPs in England highlighted several concerns, including issues of validity and representativeness.[40] A survey by the American College of Physicians Executive survey reported that only 12% of the 730 physicians who responded thought online rating websites were useful and 39% agreed with the ratings they had

received.[41] In a survey of hand surgeons in the USA 65% of respondents reported holding negative views of online physician rating websites and 82% felt that the contents was not useful for their practice.[42]

How reliable is online feedback?

Studies in England, Germany and the USA reported that online ratings and free-text reviews were correlated with established measures of patient feedback derived from more traditional patient satisfaction or experience surveys.[24, 26, 44-46] For example, one analysis of aggregate website visitor ratings (1-5 stars) on Yelp.com and patient experience as assessed through the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey in the USA found these to be positively correlated (r=0.49, p<0.001).[44] Likewise, an analysis of patient web-based ratings of all acute hospitals in England found a statistically significant positive correlation between the number of patients willing to "recommend the hospital to a friend" with a hospital's overall rating of patient experience (Spearman p=0.41, p<0.001).[47] A related study also found signifiant correlations for positive recommendations online with lower hospital standardized mortality ratios (Spearman ρ=−0.20, p=0.01) and lower readmission rates (ρ=−0.31, p< 0.001), and better ratings of hospital cleanliness were associated with lower rates of health care associated infections.[24] Other domains such as being treated with respect and dignity, involvement in decisions about care and staff working well together were also found to be significantly associated.[46] Evidence from the USA highlights that online feedback could usefully complement existing measures of patient experience using traditional survey methodology[44, 48], although additional content tends to pertain more to some services than others.[26]

Discussion

This scoping study explored the uses and usefulness of online patient feedback, highlighting the potential of such feedback to influence service inspection, quality, inform patient choice of provider and health policy more broadly. Our review found that awareness and usage is increasing; that most

feedback is about physicians, and typically positive; that reviews and ratings are used by some

service users to inform choice of provider or treatment; and that providers have reservations about

the validity and representativeness of feedback. Included studies found that those who post

feedback are generally not representative of the general population, tending to be younger and

more educated, but online feedback does broadly correlate with some other measures of health

care quality. Our review complements and expands two previous reviews that also reported a

relationship between health care quality and online feedback, and called for more research to be

done in this emergent area.[2, 3] It is important to note that the included literature comes from a range

of settings where approaches to service user feedback and the options for exercising choice of

provider vary.

Online patient feedback can be seen as having functions of 'choice' and 'voice'. Adams argued that

the 'voice' function of online feedback provides an opportunity for 'sousveillance' or bottom-up

monitoring and is an important tool for gathering insight to guide or inform inspections.[49] The

internet may well be perceived to provide a 'safe space' where patients can safely and without fear

of repercussion or retribution, speak honestly about their care. However, this is contradicted by

studies outlined above that suggest patients fear the repercussions of providing online feedback.

Like with other forms of feedback, patients may not be motivated to help others' choose, but to help

health care providers identify the positive and negative aspects of their care provision and drive

improvements. Several studies looked at the usefulness of online feedback websites in uncovering

patient safety issues.[50] Consequently, conceptualising and promoting them as sources of intelligence

useful for monitoring might provide service users with a further reason to contribute. However, little

is known about the motivations of those who post and available research on public and provider

attitudes to online feedback is limited.[40, 42]

Only a small number of studies included in this review considered the potential harms of online

patient feedback; these were small-scale qualitative interview studies with patients and general

practitioners that voiced their concerns rather than exploring actual harms (direct or indirect).[36, 40]

We speculate that the harms for providers might be associated with reputation, demoralisation and risks to confidentiality by responding to feedback online. For service users, reading online reviews might induce or increase anxiety or distort reality where feedback is extreme (highly positive or highly negative). Narratives offer the opportunity to organise and make sense of their experiences, but they can also wield undue influence and may cause harm if, for instance, a small number of 'unrepresentative' stories are seen as hard and fast evidence.[1]

At the same time, 'unrepresentative stories', that is, unusual single stories, outliers or discrepant feedback, might provide valuable lessons for service delivery and improvement as 'signals' that point towards problems amidst the general noise of feedback. A challenge for decision makers is ensuring that these single stories are not overlooked or dismissed, but instead used to inform improvement.

We identified several gaps in the literature. Studies have tended to focus on feedback on physicians or surgeons but and there was little evidence of feedback on other health care workers, such as nurses. We also did not identify studies that looked at the practices and processes of using online feedback to improve health care. Equally, while there is some evidence pointing to a reasonably strong link between established measures of patient satisfaction and online feedback, the evidence of a relationship with indicators of clinical quality remains less well established and warrants further explortation.[45] Finally, none of the reviewed studies considered the potential for patient feedback to be manipulated.

This study has several limitations. The stakeholder consultation was carried out within the English context and as such reflects a limited perspective. At the same time, the consultation provided an additional layer of insight that helped shape and strengthen the review. In line with the scoping review method, we did not appraise the quality of any of the included studies meaning that this scoping review can only describe what has been reported. Finally, it is possible that some studies are

omitted from this review; despite our attempts to be as comprehensive as possible we may have omitted important keywords in the search or missed relevant articles when hand-searching.

Conclusion

Ensuring patient-centred care that is be responsive to the needs of service users, patients' experiences must be included in designing, evaluating and monitoring services, and determining quality. In an increasingly digital society, where citizens provide and use feedback for a range of goods and services, online patient feedback can offer a convenient, low cost, and widely accessible mechanism to capture experiences of health care, while obviously being mindful to avoid issues of digital exclusion. This review provides important insights to inform policy development seeking to harness the opportunities offered by online feedback.

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Box 1. Summary of findings and evidence gaps identified by stakeholders

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Defining online feedback

Online feedback was broadly defined as any insight that can be found online either on structured platforms that exist to collect it (e.g. NHS Choices, CareOpinion, iWantGreatCare) or on other unstructured websites, particularly social media (Twitter, Facebook, blogs), and includes digitised paper-based feedback. It could be solicited or unsolicited. Online feedback was described as useful and important, and something that should be promoted and welcomed.

Online feedback is produced by patients or carers, but little is known about the characteristics of those who post. This information is needed to judge the usefulness of such feedback. Equally, who uses this feedback and to what end is also unclear. They may help service-users to make choices about healthcare and it is believed that they are also used to provide reassurance to service-users about others' experiences and service quality.

Identified evidence gaps:

Who provides and who uses online feedback?

Why is online feedback given and how is it used?

The stakeholders identified these two important questions on who provides online feedback, who uses it and how, and the motivations behind it. Online feedback was perceived to be largely positive and probably useful in identifying what works well in the NHS. Negative feedback was also seen as a force for good as it could help organisations to understand what improvements they should make and what lessons to learn. A central role of feedback is to provide insight to staff (frontline staff, bodies with responsibility for oversight, policymakers) to aid in quality improvement. It is a means to instigate and expedite change or improvements in the NHS, perhaps because of concern over reputation management. It could shift the power differential between staff and service-users. However, who provides online feedback and how it is used by service-users is unclear.

How do organisations currently use feedback?

There is a widely held assumption that service-users comment on issues of convenience and access (car parking, catering). This may be because it is what (they feel) is expected of them and, as such, may inflate the importance of these things. The NHS should make more effort to encourage discussion of whatever is important.

What is the content of online feedback?

The volume of online feedback was perceived to be low and the stakeholders were concerned that this might make it unusable and could skew how issues of user experience are perceived.

How reliable is online patient feedback?

Dealing with feedback is likely to add a burden to already over-stretched services and negative feedback could reduce staff morale, particularly as staff are more identifiable in small organisations. It could undermine professionals' reputations, consequently demotivating hardworking NHS staff. Soliciting feedback from could be an additional burden on those who are ill or caring full-time.

What are health professionals and service user attitudes towards online feedback?

The stakeholders were interested to know what the established evidence on attitudes to online feedback is among professionals and patients. As a group they held mixed attitudes towards it. They raised issues for professionals, such as fears around reputational damage, and wondered if patients trusted online feedback, particularly as they felt it was becoming more commonplace for the public to review products and services online.

Appendix 1: Table of all included studies

Study by first author	Aim	Method	Country
Adams 2011[1]	To examine comments made on physican review websites from the perspective of reflexivity in modern society.	Qualitative. Discourse analysis.	England, Holland, USA.
Adams 2013[2]	To examine websites where patients rate and evaluate healthcare services as mechanisms for transforming citizens into surveillers of public services in order to generate knowledge about the everyday performance of professionals and institutions.	Qualitative. Discourse analysis.	Part of a wider study in England, USA and Holland. This paper focuses on Holland.
Bardach 2013[3]	To compare hospital scores from the most widely used commercial website in the USA to hospital scores from more systematic measures of patient experience (the Hospital Consumer Assessment of Healthcare Providers and Systems; HCAHPS) and outcomes, and to assess what drives variation in the commercial website scores.	Quantitative.	USA
Bardach 2015[4]	To investigate if online narrative reviews from patients and surrogates reflect domains in the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) and to describe additional potential domains.	Qualitative. Thematic analysis	USA
Bidmon 2014[5]	To analyze factors influencing the adoption of and willingness to pay for mobile physician-rating apps.	Quantitative survey and literature review	Germany
Black 2009[6]	To evaluate and describe online healthcare provider reviews.	Quantitative. Multivariate analysis and logistic regression analyses.	USA

Study by first author	Aim	Method	Country
Brody 2010[7]	To present a fully automated method to capture what topics health consumers discuss when reviewing their health providers online.	Quantitative. Sentiment analysis using Latent Dirichlet Allocation.	USA
Brooks 2017[8]	To examine the key themes in positive and negative patient feedback on NHS (National Health Service) services in England, and to understand the specific issues within these themes and how they drive positive and negative evaluation.	Mixed methods. Machine learning and qualitative analysis	England
Brown-Johnson 2014[9]	To describe and characterize public commenting in the context of a high-profile publication on psychiatric inpatient smoking bans and subsequent news coverage on the topic.	Qualitative. Content analysis.	USA and elsewhere eg UK
Burkle 2015[10]	To explore the frequency with which patients visit and leave comments on rating site, identify most commonly visited sites, evaluate the nature of comments written and quantify the influence that positive comments, negative comments and physician medical malpractice history might have on patients' decisions to seek care from a particular physician.	Quantitative survey.	USA
Detz 2013[11]	To examine publicly available, Internet-based reviews of adult primary care physicians, specifically written by patients who report long-term relationships with their physicians.	Qualitative content analysis.	USA

Study by first author	Aim	Method	Country
Ellimoottil 2013[12]	To describe the landscape of online reviews of urologists by looking at a sample of ratings and written reviews from popular physician review websites.	Mixed methods. .	USA
Emmert & Meier 2013[13]	To analyze all physician evaluations that were posted on the German online feedback website, jameda, in 2012. To provide descriptive analysis of (1) both physician and patient characteristics, and (2) the number, distribution, and results of the ratings. To assess (3) the impact of physician and patient characteristics on the overall performance measure, and (4) the correlation between the number of ratings per patient/physician and the overall performance.	Quantitative. Descriptive.	Germany
Emmert 2012[14]	To determine and structure the quantity and type of information about physicians in the outpatient sector provided on German-language physician rating websites.	Quantitative. Descriptive.	Germany
Emmert 2014[15]	To explore the concerns of patients who commented on physician care and to address and enhance patient satisfaction.	Mixed methods.	Germany
Emmert 2015[16]	To present a comprehensive analysis of the ratings of dentists on a German physician rating website over a 2-year period.	Quantitative, correlation.	Germany

Study by first author	Aim	Method	Country
Emmert 2013[17]	To estimate the current level of awareness and use of physician-rating websites in Germany and to determine their impact on physician choice making and the key predictors which are associated with the knowledge and the use of physician-rating websites.	Quantitative, cross-sectional survey.	Germany
Emmert 2016[18]	To examine which health care providers use online rating websites and for what purposes, and whether health care providers use online patient ratings to improve patient care.	Quantitative, online-based cross-sectional survey	Germany
Frost 2015[19]	To (1) evaluate the prevalence of orthopedic surgeon ratings on physician rating websites in the United States and (2) evaluate factors that may affect ratings, such as sex, practice sector (academic or private), years of practice, and geographic location.	Quantitative descriptive study	USA
Galizzi 2012[20]	To explore the extent to which doctor rating websites are known and used among a sample of respondents from London. To understand the main predictors of what makes people willing to use doctor rating websites.	Quantitative cross-sectional study	England
Gao 2012[21]	To describe trends in patients' online ratings over time, across specialties, to identify what physician characteristics influence online ratings, and to examine how the value of ratings reflects physician quality.	Quantitative descriptive study.	USA

Study by first author	Aim	Method	Country
Gao 2015[22]	To provide one of the first analyses of how online ratings reflect physician quality as perceived by a broader population of patients.	Quantitative correlation	USA
Gilbert 2015[23]	To assess radiologist representation on rating sites.	Quantitative descriptive study.	USA
Glover 2015[24]	To examine the extent to which hospitals utilize social media and whether user-generated metrics on Facebook® correlate with a Hospital Compare® metric, specifically 30-day all cause unplanned hospital readmission rates.	Quantitative. Retrospective cross-sectional study.	USA
Grabner-Krauter 2015[25]	To explore how certain characteristics of physician reviews affect the evaluation of the review and users' attitudes toward the rated physician.	Quantitative survey.	Austria
Gray 2015[26]	To measure the association between US physician website ratings and traditional quality measures of clinical and patient experience.	Quantitative. Regression analyses.	USA
Greaves, Laverty 2014[27]	To describe the frequency of tweets sent to hospitals in the English National Health Service and to examine whether they contain information about quality of care. To compare sentiment on Twitter about hospitals with established survey measures of patient experience and standardised mortality rates.	Mixed methods. Qualitative content analysis and sentiment analysis.	England

Study by first author	Aim	Method	Country
Greaves, Pape, King 2012[28]	To describe patterns observed and analyse associations with unsolicited ratings posted on NHS Choices for all acute hospitals in England and conventional measures of patient satisfaction obtained through formal surveys. To compare the strength of associations between NHS Choices ratings and clinical outcomes and associations between patient survey measures of experience and clinical outcomes.	Quantitative. Cross-sectional observational study.	England
Greaves, Pape, King 2012[29]	To examine hospital-level associations between web-based patient ratings on the NHS Choices Website and objective measures of quality.	Quantitative. Cross-sectional observational study.	England
Greaves, Pape, Lee 2012[30]	To examine the usage of NHS Choices and associations between web-based patient ratings and conventional measures of patient experience and clinical quality in primary care.	Quantitative. Cross-sectional observational study.	England
Greaves, Ramirez-Cano 2013[31]	To use machine learning to understand patients' unstructured comments about their care.	Quantitative. Sentiment analysis.	England
Hanauer 2014[32]	To understand, within the context of other types of rating sites, parents' awareness, perceptions, and use of physician-rating sites for choosing primary care physicians for their children.	Quantitative. Cross-sectional, nationally representative survey.	USA
Hanauer 2014[33]	To survey a nationally representative sample of the US population about their knowledge and use of online ratings for selecting a physician for themselves.	Quantitative, experimental 5x2 factorial design.	USA

Study by first author	Aim	Method	Country
Hao 2015[34]	To examine and describe online doctor reviewing in China.	Quantitative. Descriptive statistical study.	China
Hao 2016[35]	To automatically extract hidden topics from Web-based physician reviews using text-mining techniques to examine what Chinese patients have said about their doctors and whether these topics differ across various specialties.	Quantitative. Descriptive statistics and Latent Dirichlet Allocation.	China
Hawkins 2015[36]	To assess the use of Twitter as a supplemental data stream for measuring patient perceived quality of care in US hospitals and compare patient sentiments about hospitals with established quality measures. To provide a current characterisation of US hospitals on Twitter, explore the unsolicited patient experience topics discussed by patients, and determine if Twitter data are associated with quality of care, as compared with other established metrics.	Quantitative. Machine learning approach/ sentiment analysis.	USA
Hopper 2015[37]	To test the usefulness of sentiment analysis and time-to-next-complaint methods in quantifying text-based information located on the internet.	Quantitative. Sentiment analysis.	USA
Jans 2015[38]	To find out how many patient ratings are necessary to outweigh an expert opinion's impact on the decision making process.	Quantitative. Experiment.	The Netherlands
Johnson 2013[39]	To survey physician leaders' about their perceptions of rating systems, measuring performance and the quality of individual doctors.	Quantitative. Survey.	USA

Study by first author	Aim	Method	Country
Kadry 2011[40]	To (1) determine the most frequently visited physician-rating websites with user-generated content, (2) evaluate the available information on these websites, and (3) analyze 4999 individual online ratings of physicians.	Quantitative, descriptive evaluation.	USA
Kanouse 2016[41]	To examine the effects of providing patient comments along with standardized performance information in a web-based public report.	Quantitative. Experimental design.	USA
Kilaru 2015[42]	To characterise the content of online reviews and explore their perspectives on US emergency department (ED) care.	Qualitative. Modified grounded theory.	USA
Kinast 2014[43]	To identify the reasons why patients write positive and negative online reviews of ophthalmologists.	Quantitative. Logistic regression.	USA
Kleefstra 2016[44]	To explore whether and how patient reviews of hospitals, as reported on rating sites, have the potential to contribute to health care inspector's daily supervision of hospital care.	Qualitative. Semistructured interviews; inductively analysed.	The Netherlands
Lagu 2010[45]	To describe the structure and content of physician-rating websites and to assess the extent to which a patient might find them valuable.	Quantitative descriptive study.	USA
Lagu 2013[46]	To better understand the content of narrative feedback and determine how it might complement other forms of publicly reported quality data, like patient experience data collected by the HCAHPS	Mixed methods	England and USA
Lagu 2016[47]	To determine if it is feasible to use social media platforms for learning about and improving hospital quality.	Mixed methods.	USA

Study by first author	Aim	Method	Country
Lewis 2015[48]	To characterize the online presence of plastic surgeons in Southern California as portrayed by physician rating websites.	Quantitative descriptive study.	USA
Li 2015[49]	To examine how the proportion and position of negative reviews on such websites influences readers' willingness to choose the reviewed physician.	Quantitative. Experimental 5x2 factorial design. Questionnaire.	USA
Lopez 2012[50]	To explore the content of Internet reviews about primary care physicians.	Qualitative. Content analysis.	USA
MacDonald 2015[51]	To determine how the public views dental care in Quebec.	Mixed methods.	Canada
McCaughey 2014[52]	To examine the relationship of social media channel utilization by health care organizations and the brand rating of those organizations, as measured by patients who have completed the HCAHPS survey.	Quantitative descriptive study.	USA
Merrell 2013[53]	To help physicians and allied health professionals explore the vast array of feedback websites to identify promising websites, and to enhance their practices.	Quantitative. Descriptive study	USA
Nakhasi 2016[54]	To explore whether Twitter is a relevant data source to learn about patient safety and capture the patient's voice.	Qualitative content analysis	USA (Tweets most likely to be from USA.)
Patel 2015[55]	To explore and describe general practitioners' attitudes toward online patient feedback, specifically their concerns.	Qualitative, descriptive.	England

Study by first author	Aim	Method	Country
Patel 2016[56]	To explore patients' views toward giving Web-based feedback and ratings to general practitioners (GPs), within the context of other feedback methods available in primary care in England, and in particular, paper-based feedback cards.	Qualitative. Thematic analysis.	England
Paul 2013[57]	To propose a joint probabilistic model that captures both the sentiment and aspects latent in the free text of online provider reviews. To elucidate the factors that most affect consumer sentiment regarding interactions with their doctor.	Quantitative. Sentiment analysis.	USA
Ranard 2016[58]	To compare the content of all Yelp narrative reviews of hospitals to domains of the HCAHPS survey. To identify which Yelp topics best correlated with positive or negative Yelp review ratings and to correlate Yelp ratings with the HCAHPS survey overall ratings.	Quantitative. Latent Dirichlet Allocation	USA
Rastegar-Mojarad 2015[59]	To create a corpus of patient experience (COPE) and report descriptive statistics to characterize COPE.	Quantitative. Natural Language Processing.	USA
Reimann 2010[60]	To examine the extent to which PRSs currently represent the constructs of patient experience and satisfaction as measured by research instruments.	Mixed methods.	Germany and USA
Riemer 2016[61]	To investigate patterns of ratings of dermatologists on commonly used feedback websites to better understand the information available to patients online.	Quantitative. Exploratory study.	USA

Study by first author	Aim	Method	Country
Rothenfluh 2016[62]	To explore the extent to which consumer decision-making based on Web-based reviews is the same for consumer services (ie, choice of a hotel) and health services (ie, choice of a pediatrician), while providing an in-depth understanding of potential differences or similarities.	Qualitative. Thematic analysis.	Switzerland
Samora 2016[63]	To understand the ethical and professional implications of physician behavior changes secondary to online physician-rating Web sites.	Quantitative. Survey.	USA
Segal 2012[64]	To determine if surgeon volume, as a proxy for clinical outcomes and patient safety, correlates with online reputation.	Quantitative. Descriptive study.	USA
Shepherd 2015[65]	To ascertain how social media users with experience of mental disorder relate to each other and the social space during internet based interactions and to uncover the potential role of resources such as Twitter for the provision of feedback on and engagement with mental health service user experience.	Qualitative. Content analysis	UK
Smith 2016[66]	To identify qualitative themes associated with patient reviews of dermatologic care on consumer reporting websites.	Mixed methods.	USA
Sobin 2014[67]	To evaluate patterns in online ratings of otolaryngologists.	Quantitative. .	USA
Speed 2016[68]	To examine the ways in which anonymity and its attendant risks and dangers are conceptualised on different sides of the NHS/community relationship.	Qualitative thematic analysis	UK

Study by first author	Aim	Method	Country
Sundstrom 2016[69]	To examine the role of health as a connective narrative among individuals organizing collectively in an online community. The "We are the 99 percent" Tumblr blog emerged as a spontaneous community platform of the Occupy Wall Street movement in the US.	Qualitative content analysis.	USA
Terlutter 2014[70]	To analyse patients' knowledge and use of online feedback websitet; describe users and nonusers in terms of sociodemographic variables, psychographic variables, and health status; and assert whether these variables can also serve as predictors of usage and nonusage.	Quantitative. Survey.	Germany
Thackeray 2013[71]	To establish the frequency of various forms (eg, spectators, creators, or critics) of online health-seeking behaviors.	Quantitative. Telephone survey.	USA
Timian 2013[72]	To ascertain if Facebook "Likes" are associated with hospital quality and patient satisfaction.	Quantitative. Exploratory.	USA
Trehan 2016[73]	To evaluate factors associated with positive online patient ratings and written comments regarding hand surgeons.	Quantitative. Exploratory study.	USA
van de Belt 2015[74]	To identify the added value of social media for two types of supervision by the Dutch Healthcare Inspectorate (DHI), the regulatory body charged with supervising the quality and safety of health care services in the Netherlands.	Mixed methods. Exploratory study	The Netherlands

Study by first author	Aim	Method	Country
Wallace 2014[75]	To demonstrate how the proposed state-of-the-art probabilistic model, that jointly captures latent aspects and sentiment, can leverage a small amount of data annotated by experts to guide topic/sentiment discovery.	Quantitative. Probabilistic model based on factorial Latent Dirichlet Allocation.	USA
van Velthoven 2018[76]	To identify the self-reported behaviour of the public in reading and writing online feedback in relation to health services.	Quantitative. Face-to-face cross sectional survey	UK
Yaraghi 2018[77]	To measure the relative importance of Web-based quality ratings from governmental and commercial agencies on individuals' choice of primary care physicians	Choice-based experiment	USA
Zhang 2018[78]	To analyse negative online reviews about physicians; to identify potential ways to improve patient satisfaction and patient-doctor relationships	Content analysis	China

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