

Examining quality of care and the impact of change on care quality in the context of healthcare

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Summary

Quality of care has become an increasingly important issue for the NHS. Quality impact assessment is a process by which changes to service provision are assessed in terms of their impact on quality of care. However, the definition and measurement of quality is problematic and a topic of debate. This report begins with a discussion about definitions of quality of care and how quality is measured. Finally, an approach is outlined for modelling and evaluating subjective assessments of expected impact of health service change on quality of care.

The multidimensional nature of quality makes it difficult to define in a general and useful way. Some definitions are too specific and some are too general. Finding a definition that balances specificity and generalisability has proved difficult. The definition and set of dimensions from Heenan et al. (2010) stood out due to it being designed for use at the board room/commissioning level, this is discussed further in defining quality of care section.

Determining which measurement approach to use to measure quality in the context of quality impact assessment is relatively straight forward compared to defining quality. An objective measurement approach requires extensive data collection and highly specific dimensions with measurable aspects. This would be impractical in relation to prospective quality impact assessment. In this context, the use of a subjective measurement approach is more practical to use.

Substantiating and evaluating subjective measurement mechanisms is not a quick and easy process. The SERVQUAL approach is used to measure service quality using self-report. This approach treats quality as a solely subjective concept making it more amenable to use with quality impact assessment. An abstract model is presented in this report, outlining how the SERVQUAL approach can be changed to describe user satisfaction agreement with expected impact on quality of care assessments.

Introduction

Quality Equality Impact Assessment (QEIA) has become a requirement for NHS England clinical commissioning groups (CCG) when commissioning changes to current practice in healthcare. A tool has been developed within Northern, Eastern and Western Devon (NEW Devon) CCG for conducting QEIA's, and this tool is a departure from the risk metrics used by other CCG's. The NEW Devon QEIA tool uses prospective subjective judgements of the impact of the change on the quality of care across the domains of patient safety, clinical effectiveness and patient experience to produce an impact on quality of care score. NEW Devon CCG has sought to understand if the current measurement method in the QEIA tool is the best way of prospectively measuring the impact of quality of a change to service provision.

This report summarises the findings of a scoping literature review which was undertaken to consolidate the variegated literature surrounding the concept of quality of care and methods of

measuring the impact on quality. This report begins by presenting various definitions of quality of care. These definitions provide the dimensions along which quality of care is then measured; the wide variety of dimensions will be discussed. A range of methods for assessing quality of care will then be presented and discussed in terms of the use of objective and subjective measurement techniques and pre-event and post-event assessment.

This report concludes with the presentation of a suggested method for prospectively assessing the impact of changes to healthcare services on quality of care.

Defining quality of care

Quality of care has been suggested as a proxy for the general quality of a healthcare system (Arah et al., 2003). Quality being described in such a broad and encompassing manner means that its definitions can be too complex and/or not sufficiently specific. An example of a general definition of quality such as “Quality of care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge” (Lohr and Schroeder, 1990) provide general guidance.

Specific definitions have been developed for different disciplines within healthcare such as General Practice (Sliwa and O’Kane, 2011), acute care (Peabody et al., 2004), nursing (Bassett, 2010), mental health (Barelds et al., 2009), dermatology (Penneys, 1997) and care in the community (Murphy, 2012). Specific definitions have been used to tailor the definition of quality to meet the perceived need of the patient being treated by a particular discipline. All of these definitions vary to a greater or lesser extent but they all use multiple dimensions that are thought to comprise the most important aspects of quality in relation to a specific healthcare discipline.

The use of varying definitions and dimensions to qualify healthcare highlights the subjectivity of quality. Donabedian (1988b) describes healthcare in terms of structure, process and outcomes. This initiated the practice whereby process would be changed and outcomes would be measured to assess the impact of a process change. In order to quantify changes to outcomes, it is necessary to have outcome measures. For example, if the change in process aims to reduce waiting list times this is relatively easy to measure since time is an objective metric. In the case of quality, identifying variables to use as outcome measures becomes more problematic.

Some papers suggest dimensions of quality that are targeted at a specific area of care (for example coronary heart disease or dermatology), reducing the scope of a definition. These dimensions can then be assigned indicators which relate to the specific context of interest. These indicators act as proxy variables for quality, meaning that they are thought to be associated with quality of care and can be measured. A scoping literature search was conducted of the Science Direct and Google Scholar databases on the subject of impact of service change on quality of care. The search terms used while searching are shown in Appendix A. Appendix B contains a list of the journal articles from this search which provided definitions of quality, the dimensions that they use to define quality and the measurement approach used or proposed if present in the article.

The dimensions of quality described in these papers vary significantly depending on the healthcare discipline or context in which they are being applied. Some articles make use of more general definitions from the Royal College of Physicians (Atkinson et al., 2010) or the Institute of Medicine

(Cooperberg et al., 2009). These definitions focus on the dimensions of safety, timeliness, effectiveness, efficiency, equity, patient-centredness/patient experience (STEEEP) and in the case of the Royal College of Physicians definition sustainability as well. The first six dimensions of quality are present in some form across the literature.

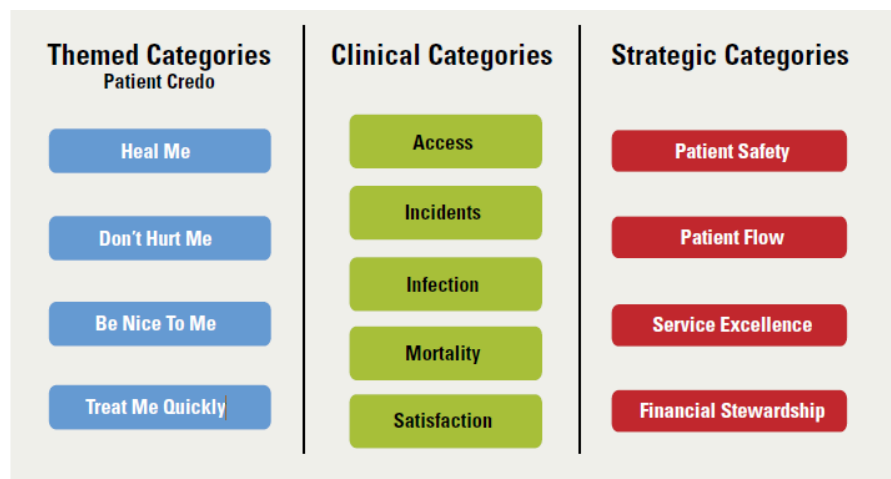


Figure 1 – Quality dimensions and categories as defined by Heenan et al. (2010)

Other definitions of quality have categorised the dimensions, splitting them into such as, clinical practice attributes, structure or strategic dimensions and person-orientated dimensions (Haggerty et al., 2007, Heenan et al., 2010). By categorising the defining dimensions of quality it is easier to see which dimensions relate to which aspects of care and how many dimensions are assessed in relation to each category.

The interpersonal aspects of care and their impact on quality are commonly stressed (Attree, 2001, Campbell et al., 2001, Chilgren, 2008, Khanchitpol and Johnson, 2013). The dimensions of healthcare quality proposed by Heenan et al. (2010) – shown in Figure 1 – are more balanced across the categories. The patient/interpersonal dimensions are included as a separate category not a dimension within another category. The subjective view of the patient and how they experience healthcare is given as much consideration as clinical outcomes and organisational strategy.

Measuring quality

There are two fundamental approaches that can be used when measuring quality - objective measurement and subjective measurement. Objective measurement relies on the measurement of observable phenomena in the real world. This might include the collection of data such as the time it takes for something to happen or the number of occurrences of a given event. Data is recorded as events occur and then analysed once all of the data has been collected. Subjective measurement differs from objective measurement in that it is an individual's impression of what has happened or might happen in the future. Subjective measurement is fundamentally different to objective measures as it includes a person's perception of what has or might happen. A subjective measurement approach can provide greater flexibility and insight into the perspective of the individual.

Objective measurement approaches for healthcare quality

Performance and quality in healthcare is most often objectively measured using ‘indicators’, which are used as proxy measures for the dimensions of quality thought to be prevalent in the situation under investigation. The structure, process and outcome framework developed by Donabedian (1988b) is often used as the basis for developing indicator measurements for quality. Changes to structure (e.g. the number of beds on a ward) or to process (e.g. a revised waiting list system) thought to be associated with specific outcomes (e.g. reduced waiting list times) can be measured and compared geographically across wards/sites/organisations and/or across time.

The collection of data for such indicator measures requires time to collect and analyse the data, and the data be collected systematically. Objective measurement methods can become resource intensive when the data, unlike Hospital Episode Statistics data, is not being collected as part of regular practice or is not easily accessible (Raleigh and Foot, 2010). Where historical data sets are available on which to forecast future expected outcomes, the analysis requires a higher level of skill and the data analysis is more time consuming.

To ensure valid measurement of healthcare quality each aspect of healthcare requires different quality indicators and different data sets tailored to the healthcare discipline and context. Even with the required data it is often impossible to be certain of cause and effect between structure, process and outcome. Donabedian (1988a) highlighted this issue and warns against the use of structure and process indicators when assessing quality of care. Outcomes should be used “...only as cues that prompt and motivate the assessment of process and structure in a search for causes that can be remedied.” (Donabedian, 1988a).

In the context of prospectively assessing the potential impact of changes to structural and process aspects of healthcare practice as dealt with by Clinical Commissioning Groups during quality impact assessment, the objective measurement of quality using disease or discipline specific indicators may not be advisable. Basing a commissioning decision on quality indicators whose cause and effect relationships of the process undergoing change and the outcomes being observed cannot be substantiated might lead to no positive change occurring. In the worst case scenario a negative impact on the quality of care may occur, and it would be difficult to understand why the negative impact has happened due to the unsubstantiated causal pathway between the structure or process undergoing the change and the outcome(s) being measured.

The large number of performance indicators, sets of data required and the analysis of that data would put quality impact assessment beyond the reach of most health professionals endeavouring to enact a change. The amount of time that would be required to collate the data would be unfeasible.

Subjective measurement approaches for healthcare quality

A systematic review of the literature carried out by Doyle et al. (2013) captured the methods of data collection used by studies investigating healthcare quality (Table 1). The preferred method for studying quality in healthcare was survey methods. This insight highlights the role of the subjective perspective of the individual in understanding quality. Surveys often collect data in the form of self-reported after the fact recollections.

In the case of the NEW Devon CCG QEIA tool, the person proposing a change to practice scores the expected impact of their proposed change on quality of care. The person proposing the change then provides evidence about why they think the change will have the expected impact on the quality of care. The evidence provided can be of any type within a standard evidence hierarchy ranging from randomised control trials reported in peer reviewed journal to professional opinion developed through experience. The QEIA tool score represents the proposers' disposition towards the topic of the change to practice that they are proposing, put simply this is their attitude towards the topic.

*Table 1 – The data collection methods for assessing patient experience, effectiveness and safety.
Table adapted from (Doyle et al., 2013).*

Methods used to measure variables	Number of studies
Patient experience variables	
Survey	31
Interviews	2
Medical records	1
Effectiveness and safety variables	
Survey for self-rated healthcare	12
Other survey	14
Medical records	3
Data-monitoring quality of care delivery (eg, audit, HQA, HEDIS)	3
Care provider outcome data	3
Physical examination	1
Patient interviews	2

The most often used subjective measurement approach to understanding quality is the SERVQUAL approach developed by Parasuraman et al. (1988). The SERVQUAL approach is based on the premise that attitude towards a given topic will inform expectations about that topic in a given situation. Satisfaction will then be achieved if perceived experience matches or surpasses their expectation. The SERVQUAL measure uses the dimensions of 'Tangibles' (the appearance of physical objects such as facilities, employees and communication materials), 'Reliability' (the provision of services in the manner that they were promised to the user), 'Responsiveness' (the provision of prompt and timely service), 'Assurance' (the provision of interpersonal services such as trust, confidence, honesty and friendliness), and 'Empathy' (approachability, accessibility and understanding). The SERVQUAL questionnaire is comprised of 22 questions scored on a scale from 1 (strongly disagree) to 7 (strongly agree) and produces a composite score using all five dimensions.

While these dimensions of quality use different terminology to the Royal College of Physicians and Institute of medicine definitions they do capture many of the same concepts within them. The NEW Devon QEIA tool uses the dimensions of safety, effectiveness and patient experience to define quality. These three dimensions are captured within the SERVQUAL definition. Safety is seen within tangibles, reliability and responsiveness. Effectiveness appears within reliability, responsiveness and assurance. Due to the person centred nature of the SERVQUAL approach patient experience is present within all five of the quality dimensions.

The SERVQUAL approach has been tested in the healthcare setting on a number of occasions including Khanchitpol and Johnson (2013). In their paper Khanchitpol and Johnson provide a summary of previous studies undertaken in the healthcare setting using the SERVQUAL measure. This summary includes reliability scores for the SERVQUAL measure producing Cronbach alpha scores ranging from 0.41 (ok) to 0.947 (excellent) with the majority of reliability scores greater than 0.80. The SERVQUAL measure appears to be a reliable and valid means by which to assess service quality in the healthcare setting by self-report.

Furthermore there is the potential to use the SERVQUAL approach to model expectation of change satisfaction and agreement between individuals regarding their expectations of the impact of a change to practice on quality of care.

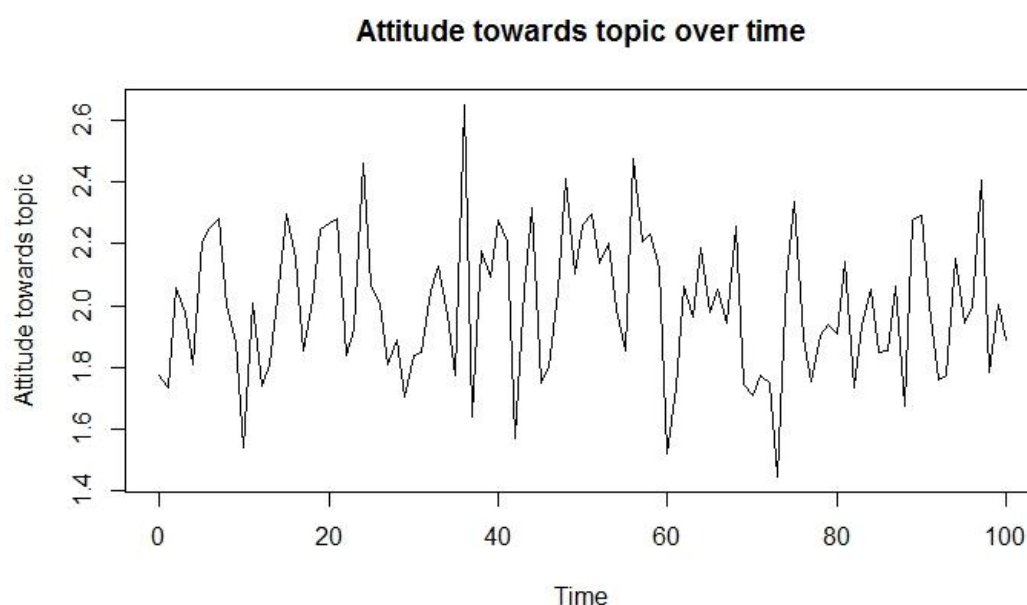


Figure 2 – The variation of a person's attitude towards a topic over time

Modelling expectation of change and agreement between individuals

Parasuraman et al. (1988) describes assessments of quality as originating with the attitude of the individual. However, Figure 2 shows that attitudes are not stable and in fact they fluctuate over time. Fluctuation may occur due to multiple factors such as; the individuals memory of events related to the topic of the attitude, social influence of others impacting through discussion of the topic, variation in affect as related and unrelated to attitude topic. This is a continuous process of reevaluation of the information and feelings and interpretation of that knowledge and feelings that results in the fluctuation of attitude over time. Such fluctuations in attitude can be small or large depending on the information, emotion and reevaluation undertaken by the individual.

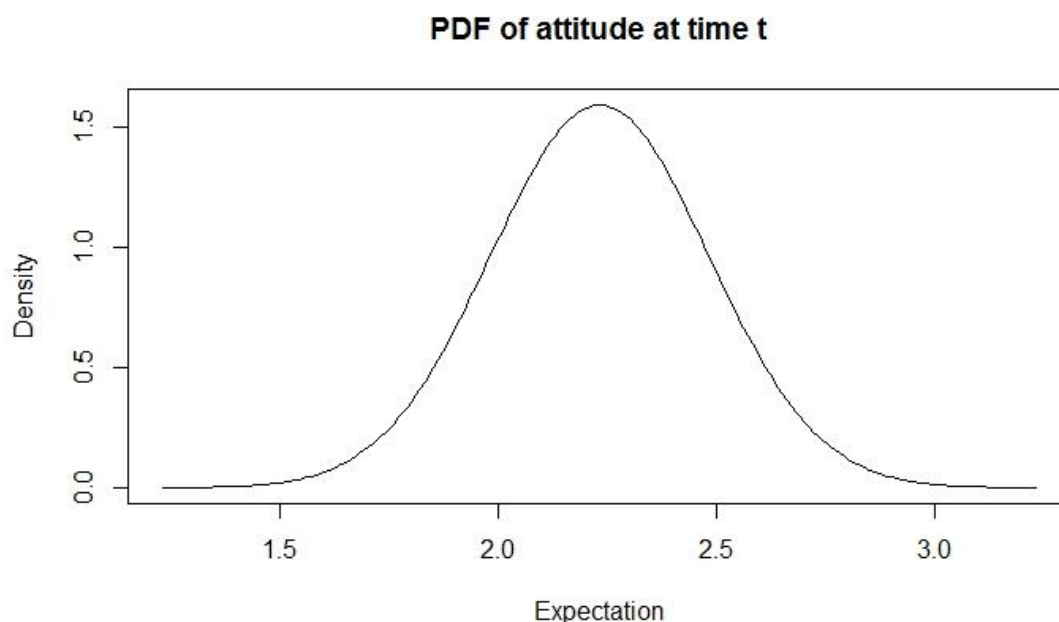


Figure 3 – Probability density function plot of attitude at time t to determine expectation

In general terms an evaluation of service quality takes place in a specific context at a particular time (t). The mean attitude (m) of the individual at time t will act as the basis for the individual's expectation of the level of quality which they will encounter. At time t the context will have an impact on a person's expectation of service quality. The most likely outcome is that the person's expectation will be close to their attitude toward the topic. Figure 3 shows the probability density function (PDF) of the attitude m, at time t with a standard deviation (s) the same as attitude variation over time in Figure 2. The PDF in Figure 3 shows the range of a person's expectation level on the X-axis and the likelihood of that level of expectation being harboured by the individual at time t on the Y-axis.

Figure 3 shows that a person's quality expectation at time t will most likely be similar to their attitude m but the context in which the quality judgement is being made may make their expectation lower or higher than their attitude. Satisfaction with service quality is most likely to occur if a person's perceived experience exceeds their expectations. Figure 4 shows the cumulative density function of a person's attitude at time t. This describes the likelihood of a person's perceived experience not exceeding their expectation with expectation on the X-axis and the cumulative probability of dissatisfaction on the Y-axis. The greater a person's expectation relative to their baseline attitude m, the less likely they are to be satisfied with the quality of the service.

This mathematical description of the SERVQUAL approach to measuring service quality provides an opportunity to model the assessments of service quality from multiple people and determine the likelihood of them reaching the same conclusions. In the case of the NEW Devon QEIA tool this method could be used to model the subjective assessment of impact on quality of care carried out by both the person proposing a change to healthcare practice and the person reviewing the proposed change and deciding if it should take place.

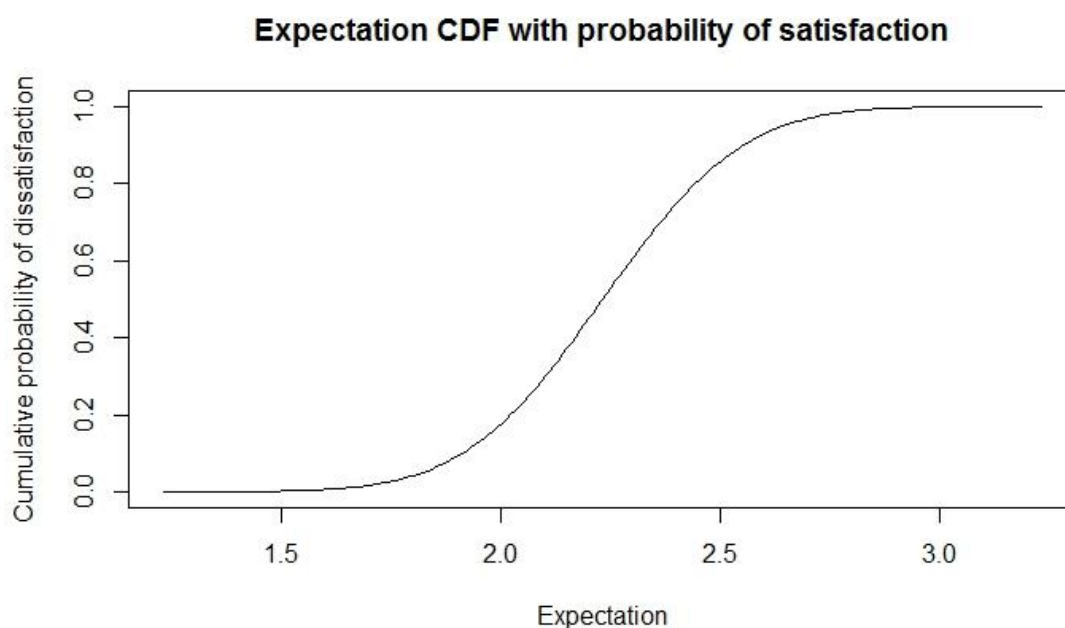


Figure 4 – Cumulative density function plot of attitude at time t to determine the probability of dissatisfaction resulting from expectation

Application of the model to the NEW Devon CCG QEIA tool

In the SERVQUAL approach to measuring service quality perceived experience and expectations are measured using two multi-item scales. To assess the QEIA tool in the SERVQUAL framework expectations are assumed to be the same as knowing what the context for the proposed change is and having a basic outline of what the proposed change is. Perceived experience is the same as having all of the information about the proposed change including any quantitative scores of impact or risk and evidence to justify the proposed change.

The SERVQUAL framework and the model described in this document could be tested using the existing SERVQUAL questionnaires and an additional attitude questionnaire. The attitude questionnaire could be administered alongside the first part of the SERVQUAL questionnaire to measure expectations for both the proposer and the reviewer before they complete the QEIA process for a given proposal. The second part of the SERVQUAL questionnaire measuring the perceived experience could then be administered after its completion. Agreement could then be

further assessed by the reviewer completing the quantitative aspects of the tool prior to seeing the scores attributed by the proposer.

Figure 5 shows an illustrative example of the attitudes of two people; the person proposing the change (the proposer) and the person assessing if the change is worth making (the reviewer). This example illustrates two people with differing attitudes to the same topic. The next step is to select a time (t) and take the corresponding attitudes (m) for each person. The proposer has a more positive attitude to the topic than does the reviewer in this instance at time t .

Figure 6 then shows the PDF's of the two people's attitudes at time t . Both the reviewer and the proposer will most likely be influenced in different ways by the context of the proposal at time t . The attitude of the reviewer varies less than the proposer which is why the normal distribution in red is narrower. The attitude of the reviewer was also more negative which is why it is more to the left of the graph. The expectation levels in the context at time t diverge from the means for both the reviewer and the proposer. The reviewer's expectation is higher than the mean and the proposer's expectation is lower than the mean.

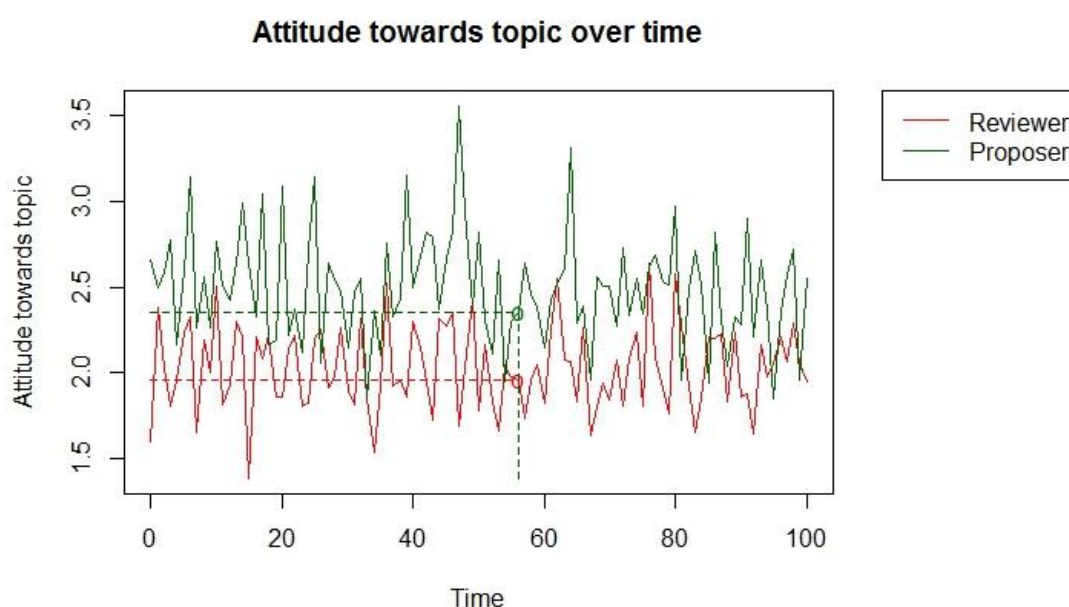


Figure 5 – Attitudes of a hypothetical reviewer and proposer over time

The levels of expectation for the proposer and the reviewer can be seen on the CDF plots in Figure 7. The proposer has a lower than average (m) level of expectation - the probability of their perceived quality experience being lower than their expectation of quality is low. This means that they would more likely be satisfied with the quality of service. The reviewer however has a greater than normal level of expectation. The probability of their perceived quality experience being lower than their expectation of quality is very high; they would most likely be dissatisfied with the quality of service.

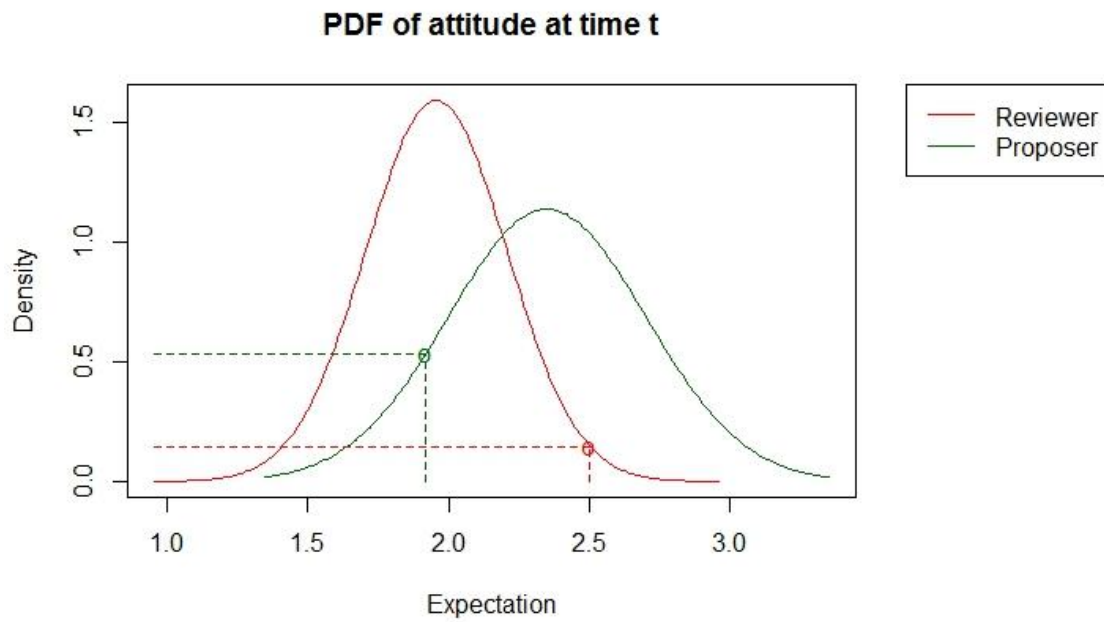


Figure 6 – Probability density function plots for a hypothetical proposer and reviewer showing expectation levels

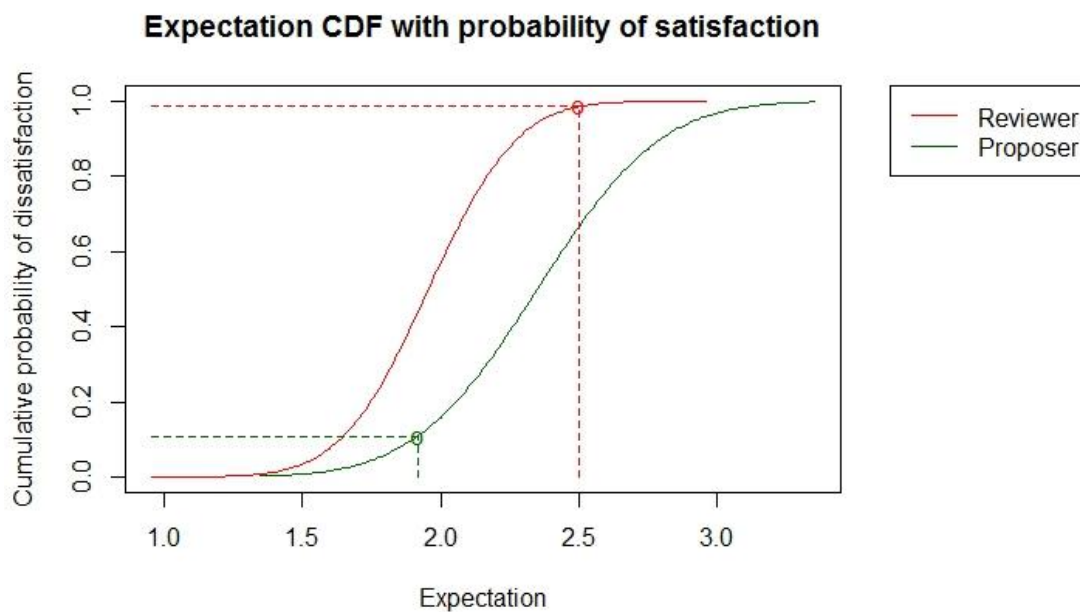


Figure 7 – Cumulative density function plots for a hypothetical proposer and reviewer

When for either the reviewer or the proposer their expectation at time t , is *less* than their attitude m at time t , their perceived experience at time t is more likely to be *greater* than their expectation resulting in *satisfaction* with the level of care quality. The alternative is that when expectation at time t is *greater* than their attitude m at time t , their perceived experience at time t is more likely to be *less* than their expectation resulting in *dissatisfaction* with the level of care quality.

It is proposed that projects assessed using the NEW Devon QEIA tool will be more likely to be approved if the reviewer has a more positive attitude towards the topic being assessed than the proposer and the reviewer's expectation is lower than the proposer's expectation. This outcome is expected because the proposer will be more likely to provide sufficient evidence and scores that are consistent with satisfying a more negative attitude when completing the QEIA tool. It is possible that expectation alone will be sufficient to predict satisfaction with a proposal going through the QEIA process.

Conclusions

Quality in the context of healthcare is a concept that is most often either defined in general terms so as to be as widely applicable as possible or highly specific terms so as to relate only to one disease or process. When these definitions are too specific they are not useful in other contexts and when too general they do not provide useful levels of detail. The approach first suggested by Donabedian (1988b) of using 'structure', 'process' and 'outcome' as a means of separating elements of healthcare to assess quality can at best only define the area where a change will take place and guide measurement.

For commissioning, using a definition of quality which includes the perspective of the patient, the clinical elements and strategic aspects relevant to healthcare operations when assessing the impact of a change on the quality of care such as those used by Heenan et al. (2010) would be most useful. These dimensions are sufficiently general to apply to a wide variety of healthcare contexts without being so general as to be useless for assessing quality.

In relation to the NEW Devon QEIA tool, the use of objective measurement techniques - particularly performance indicators - would not be useful due to their specificity and the large number required when assessing different aspects of healthcare. Such an approach could be confusing for those involved in the process of assessing the impact of a change on quality requiring too much data collection, analysis and impractical time investment.

Subjective measurement techniques require less data to be collected and are more easily completed by the user, as long as evidence is provided to support the subjective judgements being made by the user. When assessing patient related factors, patient testimony is suitable. However a change to clinical treatment practices will require more objective evidence to support the subjective evaluation of impact on quality being made by the user.

The SERVQUAL approach developed by Parasuraman et al. (1988) provides a means by which to assess the likelihood that individuals will agree on the impact of a change on service quality. If quality is defined as a subjective concept, assessing the agreement between individuals about the level of perceived impact and satisfaction with the change is analogous to satisfaction with their

assessment of the positive or negative impact on quality. This provides a suitable mechanism to compare and evaluate subjective agreement between the person proposing the change and the reviewer assessing whether to approve the change or not.

This report has highlighted the breadth of dimensions across which quality can be described, measured and assessed. It has also shown that subjective rather than objective measurement is most suitable for prospective assessments of the impact of a change on the quality of care as long as the judgement is supported by evidence. Specifically, the SERVQUAL approach and model of satisfaction agreement based on the SERVQUAL approach, has the potential to substantiate the subjective measurement of the expected impact on quality of care resulting from a broad range of changes to healthcare service provision.

References

- ARAH, O. A., KLAZINGA, N. S., DELNOIJ, D. M. J., ASBROEK, A. H. A. T. & CUSTERS, T. 2003. *Conceptual frameworks for health systems performance: a quest for effectiveness, quality, and improvement*.
- ATKINSON, S., INGHAM, J., CHESHIRE, M. & WENT, S. 2010. Defining quality and quality improvement. *Clinical Medicine*, 10, 537-539.
- ATTREE, M. 2001. Patients' and relatives' experiences and perspectives of 'Good' and 'Not so Good' quality care. *Journal of Advanced Nursing*, 33, 456-466.
- BAKER, R. 2001. Part One – Defining quality. *The Journal of Clinical Governance*, 9, 89-91.
- BARELDS, A., VAN DE GOOR, I., BOS, M., VAN HECK, G. & SCHOLS, J. 2009. Care and Service Trajectories for People With Intellectual Disabilities: Defining Its Course and Quality Determinants From the Client's Perspective. *Journal of Policy and Practice in Intellectual Disabilities*, 6, 163-172.
- BASSETT, S. 2010. What defines good nursing? *Nursing Management - UK*, 16, 13-13.
- BEATTIE, M., SHEPHERD, A. & HOWIESON, B. 2013. Do the Institute of Medicine's (IOM's) dimensions of quality capture the current meaning of quality in health care? – An integrative review. *Journal of Research in Nursing*, 18, 288-304.
- CAMPBELL, S. M., HANN, M., HACKER, J., BURNS, C., OLIVER, D., THAPAR, A., MEAD, N., SAFRAN, D. G. & ROLAND, M. O. 2001. Identifying predictors of high quality care in English general practice: observational study. *BMJ : British Medical Journal*, 323, 784-784.
- CAMPBELL, S. M., ROLAND, M. O. & BUETOW, S. A. 2000. Defining quality of care. *Social Science & Medicine*, 51, 1611-1625.
- CHILGREN, A. A. 2008. Managers and the new definition of quality. *Journal of Healthcare Management*, 53, 221-229.
- COOPERBERG, M. R., BIRKMEYER, J. D. & LITWIN, M. S. 2009. Defining high quality health care. *Urologic Oncology: Seminars and Original Investigations*, 27, 411-416.
- DONABEDIAN, A. 1988a. Quality Assessment and Assurance: Unity of Purpose, Diversity of Means. *Inquiry*, 25, 173-192.
- DONABEDIAN, A. 1988b. The quality of care: How can it be assessed? *Jama*, 260, 1743-1748.
- DOYLE, C., LENNOX, L. & BELL, D. 2013. A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. *BMJ open*, 3, e001570.
- GRIMMER, K., LIZARONDO, L., KUMAR, S., BELL, E., BUIST, M. & WEINSTEIN, P. 2014. *An evidence-based framework to measure quality of allied health care*. BioMed Central.
- HAGGERTY, J., BURGE, F., LÉVESQUE, J.-F., GASS, D., PINEAULT, R., BEAULIEU, M.-D. & SANTOR, D. 2007. Operational Definitions of Attributes of Primary Health Care: Consensus Among Canadian Experts. *The Annals of Family Medicine*, 5, 336-344.

- HEENAN, M., KHAN, H. & BINKLEY, D. 2010. From boardroom to bedside: how to define and measure hospital quality. *Healthc Q*, 13, 55-60.
- HOWIE, J., HEANEY, D. & MAXWELL, M. 2004. Quality, core values and the general practice consultation: issues of definition, measurement and delivery. *Family Practice*, 21, 458-468.
- KHANCHITPOL, Y. & JOHNSON, W. C. 2013. Measuring hospital out-patient service quality in Thailand. *Leadership in Health Services*, 26, 338-355.
- LOHR, K. N. & SCHROEDER, S. A. 1990. A strategy for quality assurance in Medicare. *New England Journal of Medicine*, 322, 707-712.
- MAKI, J., QUALLS, M., WHITE, B., KLEEFIELD, S. & CRONE, R. 2008. Health impact assessment and short-term medical missions: a methods study to evaluate quality of care. *BMC health services research*, 8, 121.
- MURPHY, W. A. 2012. Improving Patient Safety and Quality: A Focus on Falls. *Home Health Care Management & Practice*, 24, 62-64.
- NELSON, J. E., PUNTILLO, K. A., PRONOVOST, P. J., WALKER, A. S., MCADAM, J. L., ILAOA, D. & PENROD, J. 2010. In their own words: Patients and families define high-quality palliative care in the intensive care unit. *Critical Care Medicine*, 38, 808-818.
- PARASURAMAN, A., ZEITHAML, V. A. & BERRY, L. L. 1988. Servqual. *Journal of retailing*, 64, 12-40.
- PEABODY, J. W., LUCK, J., GLASSMAN, P., JAIN, S., HANSEN, J., SPELL, M. & LEE, M. 2004. Measuring the Quality of Physician Practice by Using Clinical Vignettes: A Prospective Validation Study. *Annals of Internal Medicine*, 141, 771-780.
- PENNEYS, N. S. 1997. Quality: Its definition, measurement, and applications in dermatology. *Journal of the American Academy of Dermatology*, 37, 503-507.
- RALEIGH, V. & FOOT, C. 2010. Getting the measure of quality. *Opportunities and challenges*.
- SHIELD, T., CAMPBELL, S., ROGERS, A., WORRALL, A., CHEW-GRAHAM, C. & GASK, L. 2003. Quality indicators for primary care mental health services. *Quality and Safety in Health Care*, 12, 100-106.
- SLIWA, M. & O'KANE, J. 2011. Service quality measurement: appointment systems in UK GP practices. *International Journal of Health Care Quality Assurance*, 24, 441-52.

Appendix

Appendix A – Search terms used for the scoping literature search

Quality impact assessment

“Quality impact* [assess*]”, “service quality”, measur* AND quality, “subjective quality” AND “perceive* quality”, “care quality”

“Impact on quality” AND (health* OR hospital*) NOT “of life”

Measuring impact

Quality AND “Measur* impact”

Refinement

Refine all using: health* [service*]

Expansion

Depending on the amount of useful literature returned ‘influence’ could be used in place of ‘impact’

If required due to no search results containing information about risk and quality:

Risk AND quality [AND measure* OR assess*]

Databases

Scoping search: Google Scholar and Science Direct databases

Appendix B – Table of quality dimensions and measurement approach by author

Journal Article	Dimensions of quality	Measurement
Atkinson et al. (2010)	Royal College of Physicians definition: Patient experience Effectiveness Efficiency Timeliness Safety Equity Sustainability	Measurement of outcomes
Attree (2001)	Nature of care provided <ul style="list-style-type: none"> - Patient focused - Involvement of patient in care - Acknowledgement of patients individuality - Provision of individualised care - Related to need - Anticipation of need and willingness to help Nature of relationship with patient <ul style="list-style-type: none"> - Development of social relationship/rapport - Knowledge of patient as a person - Communication pattern and information passage - Demonstration of kindness, concern, compassion and sensitivity - Time for patients: staff availability and accessibility 	Qualitative assessment
Baker (2001)	Access to services Relevance of need Effectiveness Equity Social acceptability Efficiency and economy	None
Barelds et al. (2009)	Organisational perspective <ul style="list-style-type: none"> - Effectiveness and economy - Efficiency - Strengthening/maintaining position - Equity - Need Clients perspective <ul style="list-style-type: none"> - Continuity of care and services - Accessibility 	None

	<ul style="list-style-type: none"> - Availability - Flexibility - Seamless transitions 	
Beattie et al. (2013)	Patient centredness Effectiveness Efficiency Timeliness Equity Caring Navigating the system Coordination	None
Campbell et al. (2000)	Access/availability Effectiveness	NHS national performance framework outcome indicators
Cooperberg et al. (2009)	Institute of Medicine's definition: Safety Effectiveness Patient-centredness Timeliness Efficiency Equity	Measurement of outcomes
Doyle et al. (2013)	Patient experience Clinical effectiveness Patients safety	Multiple methods for each dimension see table...
Grimmer et al. (2014)	Efficacious Effective Safe Quality interactions Integrated care Acceptable Affordable Appropriate Optimal Patient centred Equitable Meets patient and family needs	None
Haggerty et al. (2007)	Clinical practice attributes: First contact accessibility Accessibility – accommodation Comprehensiveness of services Informational continuity Management continuity Technical quality of clinical care Structural dimensions: Clinical information management Multidisciplinary team Quality improvement process System integration Person-oriented dimensions: Advocacy Continuity relational	None

	<p>Cultural sensitivity Family centred care Interpersonal communication Respectfulness Whole person care Community-oriented dimensions: Client/community participation Equity Intersectoral team Population orientation System performance: Accountability Availability Efficiency/productivity</p>	
Heenan et al. (2010)	<p>Patient categories: Heal me Don't hurt me Be nice to me Treat me quickly Clinical categories: Access Incidents Infection Mortality Satisfaction Strategic categories: Patient safety Patient flow Service excellence Financial stewardship</p>	Outcome based measures
Howie et al. (2004)	<p>Patient centredness: Patient centred consulting skills Patient priorities Sharing decision making between patients and doctors Holism</p>	Consultation quality index (CQI)
Khanchitpol and Johnson (2013)	<p>Responsiveness Empathy Assurance Tangibles Reliability</p>	Subjective service quality measure (SERVQUAL)
Maki et al. (2008)	<p>Cost Efficiency Impact Preparedness Education Sustainability</p>	Survey method
Nelson et al. (2010)	<p>Patient: Communication Patient focused decision making Clinical care:</p>	Dimensions derived by focus group Self-report measures suggested

	<p>Comfort Dignity Personhood Family: Access Proximity Support including bereavement care</p>	
Penneys (1997)	<p>Efficacy Effectiveness Efficiency Optimality Acceptability Legitimacy Equitability</p>	Structural, process, usage and outcome measurements
Shield et al. (2003)	<p>Practice level: Access – access, policy and procedure, information, medical records. Effectiveness – patient staff relations, confidentiality and consent, comprehensive assessments, patient involvement in treatment plans, psychotropic prescribing, psychological treatment, follow-up. Primary care: Registration Equity Referrals Psychotropic prescribing Comprehensive mental health services Mental health promotion Training and development Out of hours care Effective partnerships Monitoring</p>	Structural, process, usage and outcome measurements