

The impact of public disclosure of health performance data: a rapid review

Jim Pearse
Deniza Mazevska

An **Evidence Check** review brokered by the Sax Institute

December 2010

This rapid review was brokered by the Sax Institute.

This report was prepared by Jim Pearse and Deniza Mazevska

December 2010

© The Sax Institute, 2012

This work is copyright. No part may be reproduced by any process except in accordance with the provisions of the *Copyright Act 1968*.

Enquiries regarding this report may be directed to:

Knowledge Exchange Program

The Sax Institute

Level 2, 10 Quay Street Haymarket NSW 2000

PO Box K617 Haymarket NSW 1240 Australia

T: +61 2 95145950

F: +61 2 95145951

Email: knowledge.exchange@saxinstitute.org.au

Suggested Citation:

Pearse J, Mazevska D. The impact of the public release of health performance data on effectiveness and efficiency: an Evidence Check rapid review brokered by the Sax Institute (www.saxinstitute.org.au), 2010.

Disclaimer:

This **Evidence Check** review was produced using the Evidence Check methodology in response to specific questions from the commissioning agency. It is not necessarily a comprehensive review of all literature relating to the topic area. It was current at the time of production (but not necessarily at the time of publication). It is reproduced for general information and third parties rely upon it at their own risk.

Contents

EXECUTIVE SUMMARY	5
1 Background	16
Introduction to the project.....	16
Review Terms of Reference.....	16
2 Review methodology	18
Conceptual framework	18
Previous reviews.....	21
Selection strategy for current review	26
Search strategy for current review	26
Quality assessment.....	27
Data abstraction.....	29
3 Reporting initiatives	30
Reporting systems evaluated in the literature – individual and organisational providers	30
Reporting systems evaluated in the literature – health plans	34
Other reporting systems	37
4 Analysis of Studies	39
Results - individual providers	39
Results - organisational providers.....	42
Results - health plans	50
5 Conclusions	55
Summary of the evidence.....	55
Specific review questions	58
References	113
Appendices	
Appendix 1: Search strategy	63
Appendix 2: Excluded studies.....	64
Appendix 3A: Individual provider studies – quality assessment	66
Appendix 3B: Individual provider studies – results.....	69
Appendix 4A: Organisational provider studies - quality assessment.....	72
Appendix 4B: Organisational provider studies – results.....	81
Appendix 5A: Health plan studies – quality assessment.....	89
Appendix 5B: Health plan studies – results	93
Appendix 6: Provider reporting initiatives that have been evaluated.....	97
Appendix 7: Sample screens from reporting initiatives.....	102
Appendix 8: Web-based reporting systems	109

Table of acronyms and abbreviations

AMI	Acute Myocardial Infarction
CABG	Coronary Artery Bypass Surgery
CAHPS	Consumer Assessment of Health Plans
CHF	Congestive Heart Failure
CHOP	California Hospital Outcomes Project
GCHQC	Greater Cleveland Health Quality Choice
HCFA	Health Care Financing Administration
HEDIS	Health Plan Employer Data and Information Set
HQA	Hospital Quality Alliance
NCQA	National Committee for Quality Assurance
NHS	National Health Service
NYS CSRS	New York State Cardiac Surgery Reporting System
PCI	Percutaneous Coronary Intervention
PHC4	Pennsylvania Health Care Cost Containment Council
US	United States
UK	United Kingdom

EXECUTIVE SUMMARY

Public disclosure of the performance of health care providers is increasingly being used as a tool by payers to improve the efficiency and effectiveness of health care. Since the 1980s, publicly available information on the quality of health care (including plans, and individual and organisational providers) has proliferated, which is particularly due to the uptake of technology that has the potential for its widespread dissemination (i.e. the internet).

Australia has had limited experiences with public disclosure of performance information relating to health care providers compared with countries such as the United States, the United Kingdom, the Netherlands and Germany. However, arising from the recent National Health and Hospitals Network Agreement (COAG 2010), an Australia-wide initiative is currently being discussed.

The evidence in relation to public disclosure of performance information on factors such as outcomes for patients, improved processes of care, improved patient experiences, health care costs etc. has been mixed.

Given this context, the Sax Institute commissioned an evidence-based summary of the effects of public disclosure of performance information on hospital effectiveness, efficiency and patient outcomes. Health Policy Analysis was engaged to undertake this work.

The Sax Institute had previously commissioned a similar review to provide an update to previous reviews of the international evidence of public reporting of health care performance data on the general public/patients, health care professionals and provider organisations (Chen 2010, available on www.saxinstitute.org.au/contentUploadedByEWeb/Files/BHI%20Report%20FINAL.pdf).

The current review revisits and adds to this previous review. It has (a) re-examined the literature reviewed in the Chen and prior reviews with a view to identify both efficiency and effectiveness impacts of public release; (b) abstracted and extracted additional information about the nature of public disclosure systems studies; (c) extended the literature search to more recent literature published since the Chen review; and (d) analysed results in terms of underlying public disclosure systems in addition to findings from individual published studies.

The current review revisits the conceptual framework used by Chen which was based on a framework initially developed by Berwick et al. 2003 and modified by Fung et al. 2008. An amended framework was developed (see Figure 1), in which we distinguish:

- The characteristics of the public disclosure *intervention* itself
- The *agents* responding to performance data that has been released, specifically those who have a capacity to influence the choice of provider (consumers, purchasers and referring clinicians) and provider organisations or individuals
- The *mechanisms* through which change occurs
- Any *impacts*, including outcomes, unintended impacts, allocative and technical efficiency.

The framework also recognises that there are steps in the caUSI pathway between the release of information and agents taking action. For agents to take actions, they must first be aware of the performance information, be able to understand to a reasonable extent what the performance information means and be motivated by that performance information (i.e. it must address something that agents perceive to be important).

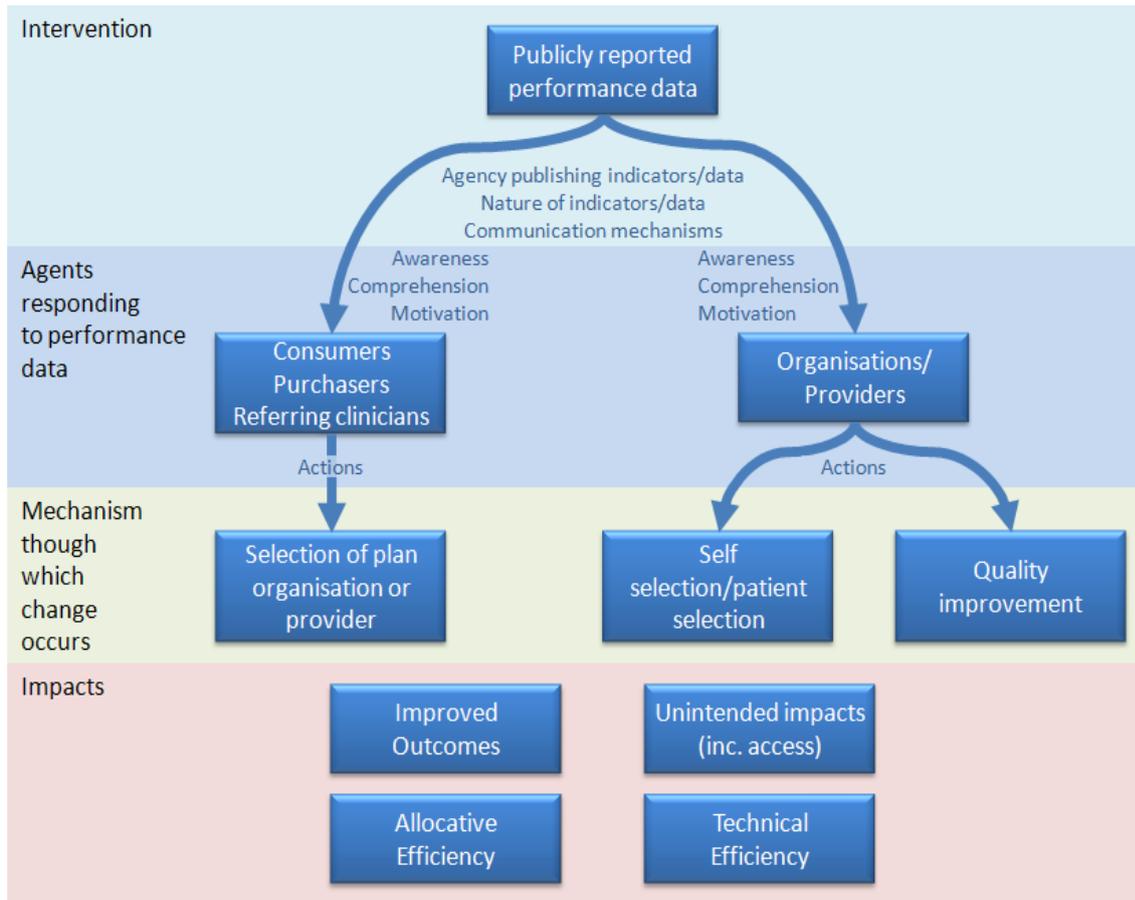


Figure 1. Framework used for the current review

Previous reviews of the impact of public disclosure have been conducted by Marshall, Shekelle, Brook et al. 2000 (see also Marshall, Shekelle, Leatherman et al. 2000), Schauffler & Mordavsky 2001, and Fung et al. 2008 (see also Shekelle et al. 2008) and Chen 2010.

A particular feature of previous reviews is that, apart from Marshall, Shekelle, Brook et al. 2000, there was no attempt to analyse the findings of studies relating to individual public disclosure initiatives. For example, in Chen 2010, 28 of the 51 findings reported in relation to individual and organisational providers related to a single initiative – the New York State Cardiac Surgery Reporting System (NYS CSRS). The 28 findings were from 17 journal papers, and sometimes presented contradictory findings in relation to the effects of public disclosure.

For the current review, we initially established a set of criteria for identifying studies for inclusion. Included studies:

1. Involved public release of information or an experimental test of possible publicly released information
2. Involved the release of information on quality or effectiveness of clinical services, or consumer assessment of health services
3. Evaluated consumer or provider responses to the publicly released data, or evaluated potential responses in a controlled experiment situation.

In contrast to previous reviews, we have separately reported results of experimental studies involving consumers choosing between hypothetical alternatives, with or without quality information. We excluded consumer based studies that asked what types of information consumers thought were important. We also excluded consumer based studies that examined consumer comprehension of quality information.

We repeated the key elements of the Fung et al. 2008 search strategy adopted by Chen 2010 using PubMed for 1 January 2009 to 25 October 2010. Instead of using a forward search on the Marshall and Schauffler review papers, we conducted a forward search on Fung et al. 2008. This search identified 725 papers.

Following a review of abstracts of the 725 papers, we selected 43 publications for further review. Following reading the 43 articles and eliminating studies already identified, we selected 6 new studies for review that were not included in Chen (2010).

We also obtained all articles included in Marshall, Shekelle, Brook et al. 2000 and Schauffler & Mordavsky 2001 that had not been included in the Fung et al. 2008 review. We identified 30 papers from these earlier reviews that had not been included in either the Fung or Chen reviews. From these we identified 10 papers that we considered appropriate for inclusion in this review. While reviewing papers, we also identified several that were included in the Chen review, but which did not meet the criteria we had identified.

In examining studies for inclusion, we identified whether a particular publication related directly to another study that had previously been included. Where two publications reported on analysis based on the same sample or data, but examined a different aspect of the impact of public reporting, we treated these as one study.

Overall, for this review we have included 14 papers related to public reporting on individual providers, 49 papers related to public reporting on organisational providers, and 16 papers related to public reporting on health plans.

We reassessed the quality of studies using the same methods adopted for the Fung and Chen reviews. Articles were assessed across two domains and also given a global assessment (see Table 1).

Table 1. Quality assessment of papers included in the review

	Domain 1	Domain 2	Global (GRADE)
Decision components	Subject of public reporting (or study population) and study participants (sample)	Types of study (i.e. study designs)	Components from Domain 1 & 2 as well as adherence, dose-response gradient, precision and validity of the outcomes, uncertainty of direction of the results
Rating criteria	How well does the study sample represent the study population?	How strong is the study design both in terms of its external and internal validity?	How much weight does the current study add to the evidence-base taking into consideration all of the components above?
Symbol used & categories of rating	<ul style="list-style-type: none"> • no overlap •• modest overlap ••• large overlap •••• complete overlap 	<ul style="list-style-type: none"> • weakest design •• modest design ••• strong design •••• strongest design 	<ul style="list-style-type: none"> √: little weight √√: moderate weight √√√: great weight

Papers were assessed independently by two reviewers. Any disagreements between reviewers were resolved through discussion. In four instances we were unable to obtain a copy of the original paper, and we undertook the assessment based on the abstract. All papers were assessed, but not as blind assessments, as both reviewers were familiar with the result of the Fung and Chen reviews. In a number of instances the reviewers disagreed with the previous assessment of an article's quality.

We classified outcomes into six types:

- Selection
- Quality improvement
- Clinical outcomes
- Allocative efficiency
- Technical efficiency
- Unintended consequences.

Selection outcomes were closely related to our conception of allocative efficiency. However, in some instances there was evidence concerning allocative efficiency which went beyond selection issues.

A textual description of the principal outcomes was extracted. For each of these outcome categories we identified whether the outcome was assessed through the study and if so, whether the study found an improvement (↑), deterioration (↓), no change (↔) or mixed results (↑↓) in relation to that outcome.

Our summary of findings from all studies are set out in Appendices 6 (individual providers), 7 (organisational providers) and 8 (health plans).

Twenty-two reporting systems were the subject of evaluations in the literature relating to individual or organisational providers. These initiatives and the studies in which they featured are shown in Table 2 below. The New York Cardiac Surgery Reporting System (NYS CRS) was the most frequently evaluated initiative.

Table 2. Summary of reporting initiatives evaluated in relation to individual and organisational providers

Reporting initiative	Study of individual provider	Study of organisational provider
HCFA hospital-specific mortality rates		Mennemeyer et al. 1997 Vladeck et al. 1988; Berwick & Wald 1990
NYS CSRS	Burack et al. 1999 Hannan et al. 1995 Jha & Epstein 2006 Mukamel et al. 2004 Werner et al. 2005 Mukamel et al. 2000 Mukamel et al. 2002 Mukamel & Mushlin 1998 Hannan et al. 1997	Dranove & Sfekas 2008 Peterson et al. 1998 Ghali et al. 1997 Jha & Epstein 2006 Chassin 2002 Omoigui et al. 1996 Hannan, Kilburn Jr et al. 1994; Hannan, Kumar et al. 1994 Mukamel & Mushlin 1998 Dziuban Jr et al. 1994
NYS CSRS <u>And</u> Pennsylvania Health Care Cost Containment Council (PHC4)		Dranove et al. 2003
NYS CSRS <u>And</u> California Hospital Outcomes Project (CHOP)		Romano & Hong 2004
New York PCI Reporting System	Narins et al. 2005	Moscucci et al. 2005
Pennsylvania Health Care Cost Containment Council (PHC4)	Epstein 2010 Schneider & Epstein 1996 Schneider & Epstein 1998	Hollenbeak et al. 2008 Bentley & Nash 1998 Schneider & Epstein 1998 Maxwell 1998
Greater Cleveland Health Quality Choice (GCHQC)		Baker et al. 2002; Baker et al. 2003 Clough et al. 2002 Rosenthal et al. 1997 Rosenthal et al. 1998
California Hospital Outcomes Project (CHOP)		Luce et al. 1996 Rainwater et al. 1998
California Coronary Artery Bypass Surgery (CABG) Outcomes Public Reporting Program (CCORP)	Li et al. 2010	Li et al. 2010
Georgia Partnership for Health and Accountability (PHA)		Rask et al. 2006
Hospital Quality Alliance (HQA)		Friedberg et al. 2009 Lindenauer et al. 2007
Hospital Quality Incentive Demonstration (HQID)		Drake et al. 2007
Missouri obstetrics consumer report		Longo et al. 1997
Quality Counts		Hibbard et al. 2003, 2005
UK Adult Cardiac Surgery Audit	Khan et al. 2007	
US ART Clinics		Bundorf et al. 2009

Reporting initiative	Study of individual provider	Study of organisational provider
US News and World Report Hospital Rankings		Pope 2009
Ontario Cancer Care		Duvalko et al. 2009
Ontario ,ICES Atlas (Institute for Clinical Evaluative Sciences)		Tu & Cameron 2003
Ontario, CABG		Guru et al. 2006
Ontario, EFFECT Study (Enhanced Feedback for Effective Cardiac Treatment)		Tu & Lauer 2009
NHS Star Rating		Mannion et al. 2005
France Infection Control Activity		Merle et al. 2009
Nursing Home Compare		Werner, Konetzka & Kruse 2009 Werner, Konetzka, Stuart et al. 2009 Werner et al. 2010 Mukamel et al. 2009 Stevenson 2006 Mukamel et al. 2008 Castle 2009a, b Zinn et al. 2008 Mukamel et al. 2007

All studies of the impact of the public release of performance information on health plans have been United States-based studies (see Table 3). Eleven of the studies were undertaken within the context of employment based insurance. Nine of these concerned how choices between health plans made by employees were impacted by the availability for performance information. Two studies examined the behaviours of health plans themselves in relation to public disclosure of performance information. Only one study included in the review examined Medicare beneficiaries' behaviours in terms of health plan choices following release of performance information. Two studies were of behaviours of Medicaid beneficiaries. A further three studies were experimental studies in which the choices made by a sample of consumers were compared with and without performance information.

Table 3. Context for studies in which public release of health plan performance information has been studied

Context	Specific scheme studied	Studies	Number of studies
Employment based insurance choices	Federal Employee Health Benefit guide	Jin and Sorenson 2006 Wedig and Tai-Seale 2002	11
	GM HMO Options Guide	Chernew et al. 2008/Scanlon et al. 2002	
	Harvard University employees	Beaulie 2002	
	Minnesota state employees	Knutson 1998	
	Private employer not identified	Chernew 1998 Hibbard 1997b (Employers) Scanlon 1999	
	Sample of employers	Gabel 1998	
U.S. commercial health plans		Bost 2001 McCormick et al. 2002	
Medicare Advantage (Medicare HMOs)		Dafny, 2008	1
Medicaid HMOs	Medicaid in Iowa Medicaid in New Jersey	Farley et al. 2002 Farley et al. 2002	2
Hypothetical experiment		Booske 1999; Sainford,1996; Harris 2002 Spranca et al. 2000	3

A summary of the review findings by type of reporting entity is shown in the box below.

Public reporting on individual providers

Selection/Allocative efficiency: There is some evidence that public reporting on individual providers has resulted in selection and allocative efficiency improvements. These principally relate to decisions by individual providers who have relatively poor outcomes to exit the market.

Quality improvement: There is little evidence that public reporting on individual providers has stimulated quality improvement activities. Some of the evidence to date concerns the response of hospitals where there has been a simultaneous release of individual and organisational provider information.

Clinical outcomes: There is limited evidence that public reporting on individual providers has resulted in improved clinical outcomes. Some of the evidence to date concerns the response of hospitals where there has been simultaneous release of individual and organisational provider information.

Technical efficiency: There is no evidence concerning the impact of public reporting on individual providers on costs of clinical services.

Unintended consequences: There is evidence that a predictable response by providers to the public release of quality information on individual providers may be the avoidance of high risk patients and this may exacerbate health care access problems for more vulnerable groups. These impacts could be ameliorated by close monitoring, and through better risk adjustment systems. However, this issue may also require public awareness and debate.

Public reporting on organisational providers

Selection/Allocative efficiency: There is only limited evidence that public reporting on organisational

providers (hospitals or nursing homes) has resulted in selection and allocative efficiency improvements. A recent study (Pope 2009) of a well established reporting system with wide use across the United States provides some evidence that hospital ranking have a material impact on consumer choices. However, more evidence is required to be confident about this conclusion.

Quality improvement: There is good evidence that public reporting on organisational providers (hospitals or nursing homes) stimulates quality improvements activities in the clinical areas which are the subject of reporting. However, it is not yet clear whether these quality improvement activities have lead to improved clinical outcomes.

Clinical outcomes: There is some evidence that public reporting on organisational providers (hospitals or nursing homes) leads to improved clinical outcomes, but this conclusion requires further study. Four out of seven higher quality studies concluded there was evidence of an impact on clinical outcomes.

Technical efficiency: There is no evidence concerning whether public reporting on organisational providers (hospitals or nursing homes) leads to improved technical efficiency or reduced costs.

Unintended consequences: There is evidence that public reporting on organisational providers (hospitals or nursing homes) can have unintended impacts and that these issues should be addressed by the design and monitoring of reporting systems. With public reporting, providers may avoid high risk patients and that this may exacerbate health care access problems for more vulnerable groups. These impacts can be ameliorated by monitoring and better risk adjustment systems. However, this issue may also require public awareness and debate.

Public reporting on health plans

Selection/Allocative efficiency: The evidence is uncertain in relation to the impact of the public release of quality information on selection and allocative efficiency. More recently published studies (generally related to analysis of earlier periods) provide some positive indications, but overall effects reported are modest.

Two studies indicate that an implied value of information can be estimated for consumers. The value of quality information to consumers, even where this information does not directly result in a change in choices, should be considered by policy makers when evaluating these types of initiatives.

Quality improvement: There is no evidence that public reporting on health plans has stimulated quality improvement activities.

Clinical outcomes: There is no evidence that public reporting on health plans has resulted in improved clinical outcomes.

Technical efficiency: There is no evidence that public reporting on health plans has resulted in improved technical efficiency or reduced costs.

Unintended consequences: There is no evidence that public reporting on health plans has resulted in overall adverse impacts as a result of unintended consequences. However, there is evidence which suggests public reporting systems will be more robust when all units within its scope are included in the reporting arrangements.

A summary of responses to the specific questions set out for this review follows.

Review question 1:

What models of publicly disclosed performance information have been demonstrated to be most effective in improving hospital performance in terms of effectiveness, efficiency and patient outcomes?

What the evidence indicates: No evaluations have examined the relative effectiveness of different public reporting systems.

In examining evidence across studies of different types of entities on which reports are based (individual providers, organisational providers or health plans), the evidence appears weakest in relation to reporting on health plans and strongest in relation to reporting on organisations. However, we would caution drawing conclusions about the differences between reporting on individual compared with organisational providers, as several of the systems of individual provider performance studied involved a concurrent release of organisational (hospital) information.

One potential implication of this finding for New South Wales (NSW) and Australia is that reporting on the equivalent of health plans (e.g. geographically based Area Health Services or Local Health Networks, or states and territories), is likely to be less effective than reporting on hospital level performance.

A second dimension of reporting systems is whether reporting occurs on specific indicators for particular conditions or procedures (e.g. mortality following cardiac surgery), or whether reporting is focused on more summative measures of performance (e.g. star rating systems, consumer experience rating or overall in-hospital mortality). Unfortunately, these different types of reporting systems have not been directly studied in the literature. Most studies of individual or organisational performance have been based on reporting more specific measures.

There are several reasons why more specific measures of performance may be more effective in motivating change. These are generally much more relevant to clinicians, managers and consumers requiring a specific procedure, and provide relatively clear indications of the areas in which efforts should be directed to achieve change. For example, an indicator that shows a hospital is a high mortality outlier in cardiac surgery provides a clear indication that this area requires attention. An indicator that shows that a hospital is a high mortality outlier across all admissions does not by itself provide direction on where efforts should be directed.

Designing systems of performance measurement therefore requires judgement in finding a balance of indicators that provide reasonably clear signals about areas that need improvement, but do not overwhelm people who are attempting to interpret them. One of the important issues to consider in selecting indicators for public reporting is the extent to which the indicator represents an area for improvement that has important implications. However, it is also important to ensure that a more general perspective is provided, to avoid conveying a sense that performance is always extremely variable across providers.

Review question 2:

Which of these models have been shown to positively influence clinician and patient behaviour? In these cases, what specific metrics have been shown to lead to positive behavioural changes among clinicians and patients? Who has collected the information and how has it been reported?

What the evidence indicates: As discussed above, no evaluations have examined the relative effectiveness of different public reporting systems. In examining evidence across studies of different types of entities on which reports are based (individual providers, organisational providers or health plans), the evidence appears weakest in relation to reporting on health plans and strongest in relation to reporting on organisations.

In terms of specific metrics, it is difficult to draw strong conclusions. There is more evidence concerning the effectiveness of specific measures of performance such as risk-adjusted mortality following CABG, than summative measures such as star rating systems. We offer some reasons why specific metrics might have greater impacts, but decisions on systems of performance information generally require a balance of specific and summative measures.

Review question 3:

What methods of reporting performance information have been shown to be most effective in influencing physician and patient behaviour? For example, what evidence exists regarding the effectiveness of different communication vehicles such as printed media or websites?

What the evidence indicates: Studies included in this review include systems that were set up prior to the wide spread adoption of the internet. Many of the reporting systems studied in the 1990s involved paper reports that were made available to interested parties or forwarded to all relevant consumers/providers. In some instances these reports were replicated in newspapers. Many of these systems have generally evolved to arrangements in which the report is made available as a portable document format (pdf) document on the internet (e.g. NYS CSRS). Systems developed in the 2000's have tended to involve searchable websites.

There is no clear evidence over the relative effectiveness of these alternative information delivery strategies. There have been a number of studies of consumer comprehension of alternative measures of presenting performance information, but these have not been systematically reviewed.

There appears to be a case for a combination of approaches to delivering information. If they are well designed, searchable web-based systems, have the potential to allow consumers and clinicians ready access to all relevant information about a specific hospital. However, comparative information is more likely to be better conveyed through specific reports, available in paper and forms, where tables and charts can be explained and commented on.

A number of systems gained high prominence as a result of a high level of media (principally press) coverage. If a public policy goal is to engage the community in a debate about health care quality, then there is a case for developing a strategy that allows release of relevant information through the media.

Finally, there is a case for allowing access to data sets of indicators (or relevant underlying data), to stimulate health service research on the indicators, leading to a better understanding of the indicators and how they may be improved.

Review question 5:

How have hospital performance measures been adjusted to account for important differences, such as size or complexity of cases, to allow fairer comparisons within and between hospitals?

What the evidence indicates: Most systems of public reporting involve the application of risk adjustment approaches to the measures reported. Risk adjustment involves identifying patient characteristics (e.g. age or pre-existing medical conditions) that have a material impact on the outcome measured, and adjusting the measures by standardising for these factors. Good risk adjustment systems remove the effect of the different patient population treated by different hospitals or physicians and allow for comparisons to be narrowed to the performance of the hospital or physician. However, no system of risk adjustment is perfect and there are often significant debates about which factors are relevant and which are not.

Review question 6:

What performance information has been shown to be less helpful, open to misuse or resulted in unintended negative consequences?

What the evidence indicates: From the studies examined there is not one set of information that is less helpful. Generally, the literature has concluded that overall consumer satisfaction ratings do not vary greatly and are not helpful in identifying areas for improvement. It is more important

to develop consumer assessment methods that allow consumers to rate aspects of their actual experience.

Review question 4:

What lessons have been learnt about how to optimise the effectiveness of publicly disclosed information to compare hospital performance and motivate improvement?

and

Review question 7:

What new models of publicly disclosed performance information exist, that may not yet have demonstrated their effectiveness, but appear to represent promising practices?

What the evidence indicates: There has been a significant expansion of public reporting across the world. However, it is difficult to judge exactly how promising these initiatives are. Nevertheless, there are some attributes of systems that we believe are worthwhile highlighting and appear to be related to the strength of systems:

- Many systems are government initiatives and are managed within government agencies. However, some initiatives which have been particularly successful and have a high level of recognition were developed outside the public sector. We would conclude that some level of independence from government, or at least health agencies, is useful to progress an initiative relatively quickly
- Studies provide mixed evidence on whether public reporting is more effective in promoting quality improvement and outcomes, compared with feedback and/or a system of quality improvement. Our view is that the best approach would combine public reporting with a system of quality improvement focused around those indicators. The Variable Life Adjustment Display (VLAD) system implemented in Queensland provides one example of how this might be achieved. Ideally, a system would be established where hospitals have an opportunity or obligation to investigate the reasons that they have been identified as an outlier in relation to an indicator and to identify what action they have taken to address the issue prior to public release of the information
- There are many demands for improved quality and performance information, and these generally result in service providers (hospitals and clinicians) collecting more data. It is a genuine challenge to minimise duplication in these efforts and minimise costs. A national partnership approach across public and private sectors would be useful in setting priorities for indicator development and the implementation of systems that support the collection of relevant data.

1 Background

Introduction to the project

The Sax Institute engaged Health Policy Analysis to undertake a review of evidence concerning *Public Disclosure of Information to Improve Hospital Efficiency and Effectiveness*. The review was motivated by the need for an evidence-based summary of good practices in the public disclosure of information relating to public hospital performance and the impact of public disclosure on efficiency and effectiveness of services.

This project was commissioned through the Sax Institute's *Evidence Check* program. *Evidence Check* is a knowledge brokerage service provided by the Institute on behalf of clients to commission evidence and research reviews from suitable and qualified researchers.

The project builds on an earlier evidence review commissioned by the Sax Institute (Chen 2010).

Review terms of reference

The terms of reference for the review are as follows:

The review will focus on models for public disclosure of information that have been shown to be most effective in improving hospital value for money and patient outcomes through impact on clinical and patient behaviour. Specifically, the review questions are:

- What models of publicly disclosed performance information have been demonstrated to be most effective in improving hospital performance in terms of effectiveness, efficiency and patient outcomes?
- Which of these models have been shown to positively influence clinician and patient behaviour? In these cases, what specific metrics have been shown to lead to positive behavioural changes among clinicians and patients? Who has collected the information and how has it been reported?
- What methods of reporting performance information have been shown to be most effective in influencing physician and patient behaviour? For example, what evidence exists regarding the effectiveness of different communication vehicles such as printed media or websites?
- What lessons have been learnt about how to optimise the effectiveness of publicly disclosed information to compare hospital performance and motivate improvement?
- How have hospital performance measures been adjusted to account for important differences, such as size or complexity of cases, to allow fairer comparisons within and between hospitals?
- What performance information has been shown to be less helpful, open to misuse or resulted in unintended negative consequences?
- What new models of publicly disclosed performance information exist, that may not yet have demonstrated their effectiveness, but appear to represent promising practices?

The review will identify literature relevant to models of publicly disclosed performance information for improving the effectiveness and efficiency of hospitals, and/or patient outcomes that have been implemented in Australia, North America, and the United Kingdom. The review should focus on peer-reviewed literature published between 2000 and 2010. However, seminal review

papers published prior to this period, or key 'grey literature' reports (particularly from government) may be included at the discretion of the researcher.

The review should:

- Provide a brief summary of models of publicly disclosed performance information for improving the effectiveness and efficiency of hospitals and/or patient outcomes that have been implemented and well-evaluated
- Describe in greater detail those models that have a target of changing clinician and patient behaviour to improve hospital effectiveness, efficiency and/or patient outcomes
- Identify the models of good practice that would be relevant to the NSW public hospital context
- Provide a summary of any review articles that identify critical factors associated with the effectiveness of models of publicly disclosed performance information for improving the effectiveness and efficiency of hospitals and/or patient outcomes
- Add expert opinion about the quality of the findings
- Provide a comprehensive coverage of research in the peer-review literature including academic databases (e.g. Cochrane, Medline, PsycInfo)
- Conduct a targeted search for key grey literature that might be referenced in peer-review articles from the search above
- Focus on literature published between 2000 and 2010.

2 Review methodology

This chapter outlines the methods adopted for the conduct of this review.

Conceptual framework

Previous reviews of the impact of public reporting of performance data have adopted a conceptual framework developed by Berwick and colleagues 2003 (see Figure 2). The representation of this framework was adapted slightly for the reviews conducted by Fung et al. 2008 and Chen 2010 (see Figure). This framework identified two basic mechanisms through which public disclosure might impact on performance:

- **Consumer/purchaser selection:** Consumers' (but also purchasers' and referring clinicians') increased knowledge and awareness of the performance of health care providers or plans leads them to make informed decisions to select higher quality providers. Overall, this will lead to an increase in the provision of higher quality care. However, it may also motivate low quality care providers to make meaningful changes and improve their performance in order to regain and/or maintain their market share
- **Change:** Service providers will have increased knowledge and awareness of their own performance. This will motivate, particularly low quality providers, to undertake improvement activities.

Our examination of the literature suggests there may be a further mechanism that is important:

- **Provider self selection/patient selection:** This mechanism reflects a type of response by providers (not consumers or purchasers) to publicly released performance data. Providers with low quality care may choose to exit the market. Providers may also decide to become more selective of the patients that they treat. For example, they may avoid treating higher risk patients where the likelihood of good clinical outcomes is low. The impact of these behaviours could be positive (e.g. resulting in an overall improvement in outcomes), or negative (e.g. reducing access and choice for patients).

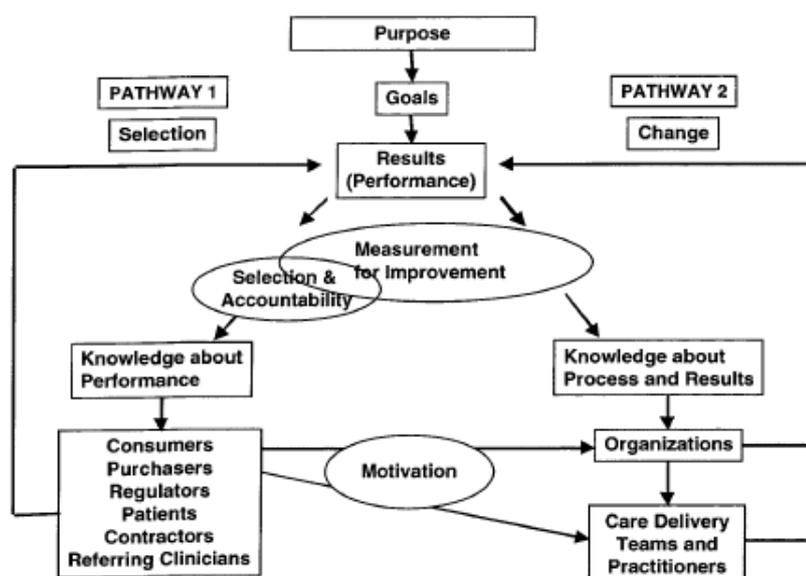


Figure 2. Two pathways to quality improvement (Berwick et al. 2003)



Figure 3. Alternative representation of two pathways to quality improvement (Fung et al. 2008)

Previous reviews (Fung et al. 2008; Chen 2010) have classified the impact of public disclosure into four broad categories:

- *Selection*: Evidence that a particular public disclosure initiative resulted in a change in the market share of health insurance plans, organisations or individual providers, or that consumer choices are responsive to additional information on quality (sometimes through a hypothetical experiment)
- *Quality Improvement*: Evidence that a particular public disclosure initiative resulted in quality improvement activities by a health plan, organisation or individual provider
- *Outcomes*: Evidence that a particular public disclosure initiative resulted in improved outcomes for patients
- *Unintended consequences*: Evidence that a particular public disclosure initiative resulted in other and unintended consequences (e.g. reduced access).

Two of these categories—selection and quality improvement—are assessments of whether ‘mechanisms’ in relation to public disclosure of information are operating as hypothesised. The other two—outcomes and unintended consequences—are assessments of impacts.

These categories align reasonably with the concept of ‘effectiveness’ discussed in the terms of reference for the current review. However, the alignment with the concept of ‘efficiency’, which is an important aspect of this review, is less clear. Efficiency has two broad subsidiary concepts:

- *Technical efficiency* is concerned with whether outputs are produced at minimal cost, or alternatively, that they are maximised for the available resources. This concept is sometimes interpreted as relating to unit costs, although there is a debate as to whether cost ratios without consideration of quality is reflective of efficiency (Hussey et al. 2009; Romley et al. 2009). One aspect of technical efficiency that has had little attention is the direct and indirect costs of public disclosure. This includes the cost of producing and releasing information, the costs to providers of producing the data on which the information is based and the costs involved in responding to publicly disclosed information. To date, these costs have been almost completely ignored in the literature
- *Allocative efficiency* is concerned with whether resources are distributed in a way that maximises societal welfare. In the current context, allocative efficient improvements could be conceptualised as whether public disclosure leads to a new distribution of resources, for example, a change in market share between providers that is an

improvement on the previous distribution. From a narrower perspective, a shift from lower quality to higher quality providers could be classified as an improvement in allocative efficiency (which is essentially similar to ‘selection’ effects). From a broader perspective, allocative efficiency should take into account consumers’ willingness to pay for quality improvements (or trade quality against other attributes such as cost of and access to health care). In addition, there is an impact on allocative efficiency through the value that consumers place on information revealed through public disclosure. This will yield value even where consumers do not shift between providers. For this review, we identified any studies that touched on any of these aspects of allocative efficiency.

For this current review, we propose a slightly amended framework for considering aspects of public disclosure and its impact. This framework is set out in Figure 4 below. In the framework, we distinguish:

- The characteristics of the public disclosure **intervention** itself
- The **agents** responding to performance data that has been released, specifically those who have a capacity to influence the choice of provider (consumers, purchasers and referring clinicians) and provider organisations or individuals
- The **mechanisms** through which change occurs
- Any **impacts**, including outcomes, unintended impacts, allocative and technical efficiency.

The framework also recognises that there are steps in the caUSI pathway between the release of information and agents taking action. For agents to take actions, they must first be aware of the performance information, be able to understand to a reasonable extent what the performance information means and be motivated by that performance information (i.e. it must address something that agents perceive to be important).

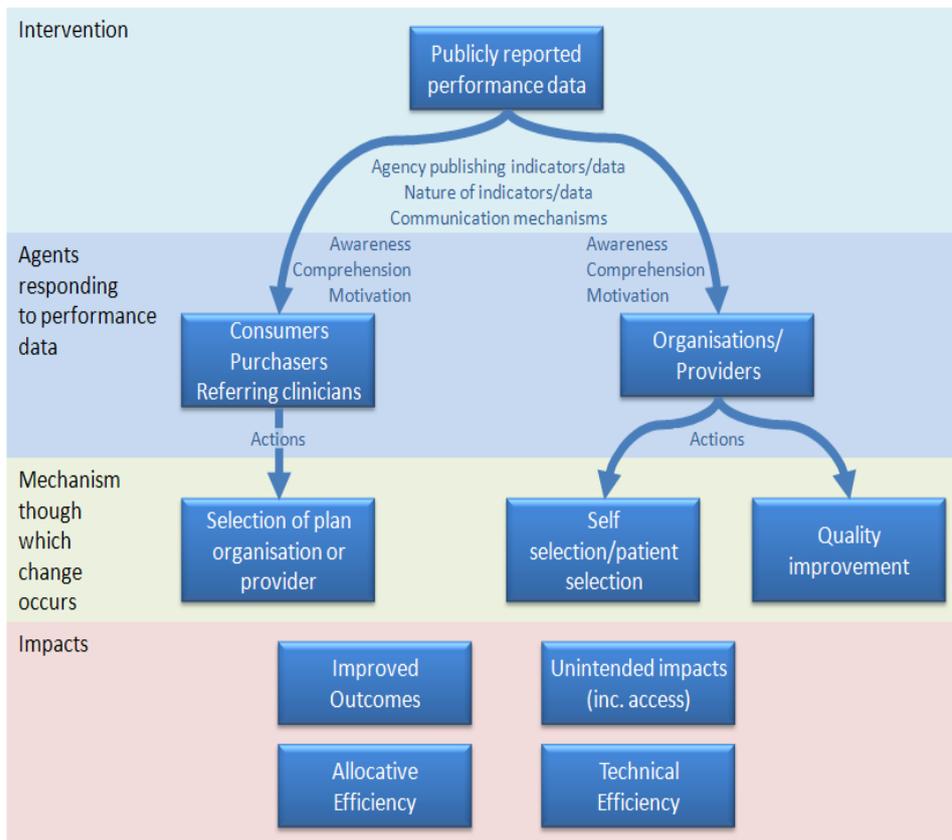


Figure 4. Framework used for the review

Previous reviews

Previous reviews of the impact of public disclosure have been conducted by Marshall, Shekelle, Brook et al. 2000 (see also Marshall, Shekelle, Leatherman et al. 2000), Schaffler & Mordavsky 2001, and Fung et al. 2008 (see also Shekelle et al. 2008) and Chen 2010.

Major features of the objectives and methods of previous reviews are presented in Table 4 below.

Table 5 presents the key findings of each of the reviews. The focus and timing of these reviews lead to slightly different conclusions. Methodologies for the reviews also vary slightly. Due to heterogeneity in outcomes measures in underlying studies, not one of reviews undertook a quantitative meta-analysis of effects.

Fung et al. 2008 and Chen 2010 grouped studies by the level of reporting (i.e. health plans, organisational providers and individual providers) and types of outcomes studied (e.g. selection, quality improvement).

A particular feature of previous reviews is that, apart from Marshall, Shekelle, Brook et al. 2000, there have been no attempts to analyse the findings of studies relating to individual public disclosure initiatives. For example, in Chen 2010, 28 of the 51 findings reported in relation to individual and organisational providers related to a single initiative – NYS CSRS. The 28 findings were from 17 journal papers, which sometimes presented contradictory findings in relation to the effects of public disclosure. Marshall, Shekelle, Brook et al. (2000) presented a table that shows the alignment of studies with the public report initiatives to which they relate.

Marshall, Shekelle, Brook et al. 2000 and Fung et al. 2008 concluded that there was limited evidence concerning the impact of publicly released data on selection of health plans, quality improvement or outcomes. They also highlighted the need for more research, and identified the areas which appeared to be more promising.

Marshall, Shekelle, Brook et al. 2000 concluded that consumers and purchasers rarely search out information and do not understand or trust it. Public reported information has a small, although increasing impact on their decision making. A slightly different emphasis on the evidence was given by Schaffler & Mordavsky 2001. They concluded that consumers desire information that is provider-specific and may be more likely to use information on rates of errors and adverse outcomes. They also conclude that purchasers may be in a better position to understand and use information about health plan quality.

Marshall, Shekelle, Brook et al. 2000 and Fung 2008 found very limited evidence that the public release of information on individual providers is effective. Marshall, Shekelle, Brook et al. 2000 concluded that physicians are sceptical about publicly reported data and only a small proportion use it.

Marshall, Shekelle, Brook et al. 2000 identified the use of the information by provider organisations for quality improvement may be the most productive area for further research. Fung et al. 2008 found some evidence that public reporting on organisation performance stimulated quality improvement and mixed evidence on its effect on clinical outcomes.

Overall, Chen 2010 made some strong more positive conclusions about the evidence concerning public release of performance information. He concluded that overall there is considerable and consistent evidence that public disclosure can and does influence plan choices. Recent evidence shows that public disclosure may be able to make significant and policy important changes of consumers' decisions in choosing hospitals in some settings, but more evidence is needed. There is strong and consistent evidence that public disclosure stimulates quality

improvement at the hospital level. There is no or limited evidence concerning reporting impact of reporting related to individual providers on quality improvement or clinical outcomes, and some evidence concerning unintended consequences.

Table 4. A comparison between objectives and methods for previous reviews

Review	Aim and review scope	Time span and search strategy	Search terms	Articles included in the review
Marshall, Shekelle, Leatherman et al. 2000	To summarise empirical evidence concerning public disclosure of performance data, relate the results to potential gains and identify areas requiring further research. Assessed evidence in relation to: use by consumers, purchasers, physicians, hospitals and other providers, impact of quality of care outcomes and impact on costs.	Between January 1986 and October 1999 using MEDLINE and EMBASE electronic databases; assisted by a professional librarian; only original research articles were included. All citations were reviewed and leading authors contacted. Documents and websites were searched for references to original evaluative studies.	MESH: report cards, public performance reports, provider profiling, public/ consumer/ patient information, and consumer reports.	A total of 21 articles were found relating to 7 reporting systems in the US. 5 other articles were cited that describe general issues related to public disclosure but not specific to any one reporting system.
Schauffler & Mordavsky 2001	To evaluate the evidence on the impact of consumer report cards on the behavior of consumers, providers and purchasers.	Between 1995 and 2000 using MEDLINE and Healthstar to identify papers published. All citations were reviewed. Some published reports.	Not available.	32 publications were included in the review.
Fung et al. 2008	To synthesise the evidence for using publicly reported performance data to improve quality. Only articles that provided empirical evidence on the impact of public reporting on outcomes (effectiveness, patient safety, and patient centeredness) and unintended consequences, as well as the selection and quality improvement activity were included. Assessed these for health plans, organisational providers and individual providers and practices.	Between January 1999 and March 2006 using Web of Science, MEDLINE, Econlit, and Wilson Business Periodicals Abstract; assisted by a professional librarian; only original research included; all citations were reviewed and leading authors contacted.	Comprehensive. Did not include gray or trade literature.	45 articles included in the review including 18 publications from Marshall's (2000) review list.
Chen 2010	To synthesise the evidence for using publicly reported performance data to stimulate quality improvement activity, after selection of providers and improve clinical outcomes. To assess the extent of unintended consequences after public reporting.	2006 to 2010, and all articles in the Fung et al. (2010) review, based on a search for 1999-2006. Conducted a forward search on Fung et al. (2008), a search on the reference list for Fung et al. (2008), a search of the database developed by Brien et al. (2010), a search of Scopus using the search terms adopted by Fung et al. (2008) for original and review articles published between 2006 and 2010.	A search of Scopus using the search terms adopted by Fung et al. (2008).	A total of 75 publications were included. These were the 45 publications included in the Fung et al. (2008) review, plus 30 additional publications.

Table 5. A comparison of results and conclusions from previous reviews

Review	Health Plans	Organisational providers	Individual providers	Overall conclusions
Marshall, Shekelle, Leatherman et al. 2000	<p>Selection: Consumers and purchasers rarely search out the information and do not understand or trust it; it has a small, although increasing, impact on their decision making.</p> <p>Quality Improvement: No evidence discussed.</p>	<p>Selection: Consumers and purchasers rarely search out the information and do not understand or trust it; it has a small, although increasing, impact on their decision making.</p> <p>Quality Improvement: Hospitals appear to be most responsive to public data.</p> <p>Clinical Outcomes: In a small number of cases public disclosure was associated with improvement in health outcomes.</p>	<p>Selection: Consumers and purchasers rarely search out the information and do not understand or trust it; it has a small, although increasing, impact on their decision making.</p> <p>Quality Improvement: Physicians are skeptical about such data and only a small proportion uses it.</p> <p>Clinical Outcomes: In a small number of studies public disclosure was associated with improved health outcomes.</p>	<p>Consumers and purchasers rarely search out information and do not understand or trust it. Public reported information has a small, although increasing impact on their decision making.</p> <p>Physicians are sceptical about publicly reported data and only a small proportion uses it. The use of the information by provider organisations for quality improvement may be the most productive area for further research.</p>
Schauffler & Mordavsky 2001	<p>Selection: Consumer report cards do not make a difference in decision making or competition.</p> <p>Quality Improvement: Consumer report cards do not make a difference to improvement of quality.</p>	<p>Selection: Consumer report cards do not make a difference in decision making or competition.</p> <p>Quality Improvement: Consumer report cards do not make a difference to improvement of quality.</p>	<p>Selection: Consumer report cards do not make a difference in decision making or competition.</p> <p>Quality Improvement: Consumer report cards do not make a difference to improvement of quality.</p>	<p>Consumers desire information that is provider specific and may be more likely to use information on rates of errors and adverse outcomes.</p> <p>Purchasers may be in a better position to understand and use information about health plan quality.</p>
Fung et al. 2008	<p>Selection: Mixed evidence on selection</p> <p>Quality improvement: No studies of quality improvement impacts</p> <p>Clinical Outcomes: Limited evidence on clinical outcomes.</p>	<p>Selection: No recent evidence on selection and mixed results from earlier studies.</p> <p>Quality improvement: Evidence that public reporting stimulated quality improvement.</p> <p>Clinical Outcomes: Mixed evidence on clinical outcomes.</p>	<p>Selection: Some evidence of selection effects</p> <p>Quality improvement: No studies on effect on quality improvement.</p> <p>Clinical Outcomes: Limited evidence suggesting improved clinical outcomes.</p>	<p>Evidence is limited, particularly with regard to the impact on individual providers and practices. Rigorous evaluation of many major public reporting systems is lacking. Authors concluded the effect of public reporting on effectiveness, safety, and patient-centeredness remains uncertain.</p>
Chen 2010	<p>Selection: Considerable and consistent evidence that public disclosure can and does influence plan choices.</p> <p>Quality improvement: Early and limited evidence of increased quality improvement activities.</p>	<p>Selection: Recent evidence suggests significant impacts on consumer selection of hospitals. More evidence is needed.</p> <p>Quality improvement: Strong and consistent evidence that public disclosure stimulated quality improvement.</p>	<p>Selection: Some evidence of influence on consumers' selection of providers.</p> <p>Quality improvement: No evidence on quality improvement.</p> <p>Clinical Outcomes: Limited evidence on clinical outcomes.</p>	<p>Overall there is considerable and consistent evidence that public disclosure can and does influence plan choices. Recent evidence shows that public disclosure may be able to make significant and policy important changes of consumers'</p>

Table 5. A comparison of results and conclusions from previous reviews

Review	<i>Health Plans</i>	<i>Organisational providers</i>	<i>Individual providers</i>	<i>Overall conclusions</i>
	<p>Clinical Outcomes: Little and uncertain evidence on impact on clinical outcomes</p> <p>Unintended Impacts: Little and uncertain evidence.</p>	<p>Clinical Outcomes: Mixed evidence on impact on clinical outcomes.</p> <p>Unintended Impacts: Little evidence that concerns over unintended consequences are justified.</p>	<p>Unintended Impacts: There is some evidence indicating that doctors may avoid riskier patients in response for public reporting. There is also limited evidence that socioeconomically disadvantaged groups may benefit less or be worse off from public reporting.</p>	<p>decisions in choosing hospitals in some settings, but more evidence is need. There is strong and consistent evidence that public disclosure stimulates quality improvement at the hospital level. There is no or limited evidence concerning reporting impact of reporting related to individual providers on quality improvement or clinical outcomes and some evidence concerning unintended consequences.</p>

Selection strategy for current review

For the current review we initially established a set of criteria for identifying studies for inclusion. Studies to be included needed to:

1. Involve public release of information, or an experimental test of possible publicly released information.
2. Involved the release of information on quality or effectiveness of clinical services, or consumer assessment of health services.
3. Evaluate consumer or provider responses to the publicly released data, or evaluate potential responses in a controlled experiment situation.

In contrast to previous reviews, we have separately reported results of experimental studies involving consumers choosing between hypothetical alternatives, with or without quality information. In the two most recent studies, these types of studies score highly on Domain 2 (see discussion below), but there are questions over the extent to which responses to hypothetical situations are reflected in consumer choices in the real world.

We excluded consumer based studies that asked what types of information consumers thought were important. As Mechanic 1989 observed some time ago, *"simply giving respondents a list and asking them to rate the importance of various facets of their medical care is unlikely to elicit their preferences accurately. Respondents will indicate that many of the items you ask them about are important, but these identical criteria may not be particularly salient to them as they make their choices."* We also excluded consumer-based studies that examined consumer comprehension of quality information.

Search strategy for current review

We repeated the key elements of the Fung et al. 2008 search strategy adopted by Chen 2010 using PubMed for 1 January 2009 to 25 October 2010. Search terms used are identified in Appendix 1. Instead of conducting a forward search on the Marshall and Schauffler review papers we conducted a forward search on Fung et al. 2008. We then used search strategies 4A and 4B from Fung et al. (2008). These searches identified 725 papers. We did not search EconLit and Wilson Business Periodicals Abstracts as had Fung et al. 2008.

Following a review of abstracts of the 725 papers we selected 43 publications for further review. Following reading the 43 articles and eliminating studies already identified, we selected 6 new studies for review that were not included in Chen 2010.

We also obtained all articles included in Marshall, Shekelle, Brook et al. 2000 and Schauffler & Mordavsky 2001 that had not been included in the Fung et al. 2008 review. These papers were read and considered for inclusion in the current review. One reason for including papers from these earlier reviews is that Fung et al. 2008 explicitly excluded papers from the Marshall review that assessed the impact on costs. We identified 30 papers from these earlier reviews that had not been included in either the Fung or Chen reviews. From these we identified 10 papers that we considered appropriate for inclusion. In reviewing papers we also identified several that were included in the Chen review, that did not meet the criteria we had identified (see section 2.3). The papers from the Marshall, Schauffler and Chen reviews that have been excluded and reasons for exclusion are shown in Appendix 2.

One paper identified in the Chen review as relating to health plans was reclassified to organisational providers (Duvalko et al. 2009).

In examining studies for inclusion we identified whether a particular publication related directly to another study that had previously been included. Where two publications reported on analysis based on the same sample or data, but examined a different aspect of the impact of public reporting, we treated these as one study.

Overall for this review we have included 14 papers related to public reporting on individual providers, 49 papers related to public reporting on organisational providers and 16 papers related to public reporting on health plans.

Table 6. Papers included and excluded from current and previous reviews*

	Individual providers	Organisational providers	Health plans
Studies excluded from current review but included in previous reviews:			
Marshall only	1	2	1
Schauffler only	1	1	10
Chen only		6	2
<i>Subtotal</i>	2	10	16
Studies included in current review, including in:			
Marshall only		1	
Schauffler only		1	4
Marshall, Schauffler	2	1	1
Marshall, Schauffler, Fung, Chen	2	6	
Marshall, Fung, Chen	1		
Fung, Chen	6		
Chen only		17	1
New Study	2	4	
Subtotal	14	49	16
Total studies in current and previous reviews	16	59	32

*Five studies were included under both individual and organisation providers

Quality assessment

We reassessed the quality of studies using the same methods adopted for the Fung and Chen reviews. These appraisal criteria were adapted by Fung from the guidelines for the assessment of quality improvement interventions (Grimshaw et al. 2003; Cochrane Effective Practice and Organisation of Care Review Group 2002). Articles were assessed across two domains and also given a global assessment (see Table 7).

The first domain concerned the extent to which the study population (or sample) was representative of the subjects of interest. Fung et al. 2008 assessed this domain on a four-point scale relating to how closely the participants or reporting system overlap with the needs of privately insured or Medicare population in the United States. Our review was specifically undertaken for policy development in an Australian context. We judged that a largely identical approach was justified. We assessed studies that dealt with whole populations (e.g. all hospitals across a country or state, or systems targeted at both privately insured and Medicare populations) highest. Systems targeted at either Medicare or privately insured populations were

ranked next. Systems related to a specific employer or population group (e.g. Medicaid) were ranked third or last, depending on the nature of population involved.

The second domain was concerned with the strength of the study design. These were assessed from the weakest design (e.g. cross sectional surveys of opinions) to the strongest design (randomised controlled trials). As mentioned before, under this ranking approach a number of 'hypothetical' studies of consumer choice could be ranked highest (and were in previous reviews). However, we judged these actually had relatively poor external validity and assessed these at a lower level. Studies with a longitudinal design and controls were generally assigned a higher level.

Table 7. Quality assessment of papers included in the review

	Domain 1	Domain 2	Global (GRADE)
Decision components	Subject of public reporting (or study population) and study participants (sample)	Types of study (i.e. study designs)	Components from Domain 1 & 2 as well as adherence, dose-response gradient, precision and validity of the outcomes, uncertainty of direction of the results
Rating criteria	How well does the study sample represent the study population?	How strong is the study design both in terms of its external and internal validity?	How much weight does the current study add to the evidence-base taking into consideration all of the components above?
Symbol used & categories of rating	<ul style="list-style-type: none"> • no overlap •• modest overlap ••• large overlap •••• complete overlap 	<ul style="list-style-type: none"> • weakest design •• modest design ••• strong design •••• strongest design 	<ul style="list-style-type: none"> √: little weight √√: moderate weight √√√: great weight

The third assessment was a global rating based on the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) system (GRADE Working Group 2007). This was a three point scale indicating whether the study should carry great weight (three checks), moderate weight (two checks) or little weight (one check) when considering evidence. This was based on assessment of the first two domains as well as other factors including the extent of report card use, and internal and external validity.

Papers were assessed independently by two reviewers. Any disagreements between reviewers were resolved through discussion. In four instances we were unable to obtain a copy of the original paper, and we undertook the assessment based on the abstract. All papers were assessed, but not as blind assessments, as both reviewers were familiar with the results of the Fung and Chen reviews. In a number of instances we disagreed with the previous assessment of an article's quality.

Our assessment of all included studies is provided in Appendices 3 (individual providers), 4 (organisational providers) and 5 (health plans). The previous reviews in which each of the studies were included are also shown.

Data abstraction

Results from included studies were re-abstracted by the two reviewers. Disagreements were resolved through discussion. Abstracting data could not be undertaken blind as both reviewers were familiar with the previous reviews. We classified outcomes into six types:

- Selection
- Quality improvement
- Clinical outcomes
- Allocative efficiency
- Technical efficiency
- Unintended consequences.

A textual description of the principal outcomes was extracted. For each of these outcome categories we identified:

- (a) Whether the outcome was assessed through the study
- (b) If so, whether the study found an improvement, deterioration, no change or mixed results in relation to that outcome.

Sometimes outcomes were ambiguous, or could be interpreted in a number of ways. For example, where individual providers with poor outcomes withdraw from the market, this may result in an overall improvement in clinical outcome. However, this may also mean reduced access to care for some members of the population. We attempted to accurately record findings and reflect the alternative perspectives in the summary of results.

Selections outcomes were closely related to our conception of allocative efficiency. However, in some instances there was evidence concerning allocative efficiency which went beyond selection issues.

Our summary of findings from all studies are set out in Appendices 6 (individual providers), 7 (organisational providers) and 8 (health plans).

3 Reporting initiatives

This Chapter provides an outline of reporting initiatives. It describes initiatives that were the subject of evaluations in the literature that we reviewed, and also provides information on other systems currently used in various countries.

Reporting systems evaluated in the literature – individual and organisational providers

Twenty-two reporting systems were the subject of evaluations in the literature relating to individual or organisational providers. These initiatives and the studies in which they featured are shown in Table 8 below. The New York Cardiac Surgery Reporting System (NYS CRS) was the most frequently evaluated initiative.

Table 8. Summary of reporting initiatives evaluated in relation to individual and organisational providers

Reporting initiative	Study of individual provider	Study of organisational provider
HCFA hospital-specific mortality rates		Mennemeyer et al. 1997 Vladeck et al. 1988 Berwick & Wald 1990
NYS CSRS	Burack et al. 1999 Hannan et al. 1995 Jha & Epstein 2006 Mukamel et al. 2004 Werner et al. 2005 Mukamel et al. 2000 Mukamel & Mushlin 1998 Hannan et al. 1997	Dranove & Sfekas 2008 Peterson et al. 1998 Ghali et al. 1997 Jha & Epstein 2006 Chassin 2002 Omoigui et al. 1996 Hannan, Kilburn Jr et al. 1994 Hannan, Kumar et al. 1994 Mukamel & Mushlin 1998 Dziuban Jr et al. 1994
NYS CSRS And Pennsylvania Health Care Cost Containment Council (PHC4)		Dranove et al. 2003
NYS CSRS And California Hospital Outcomes Project (CHOP)		Romano & Hong 2004
New York PCI Reporting System	Narins et al. 2005	Moscucci et al. 2005
Pennsylvania Health Care Cost Containment Council (PHC4)	Epstein 2010 Schneider & Epstein 1996 Schneider & Epstein 1998	Hollenbeak et al. 2008 Bentley & Nash 1998 Schneider & Epstein 1998 Maxwell 1998
Greater Cleveland Health Quality Choice (GCHQC)		Baker et al. 2002; Baker et al. 2003 Clough et al. 2002 Rosenthal et al. 1997 Rosenthal et al. 1998
California Hospital Outcomes Project (CHOP)		Luce et al. 1996 Rainwater et al. 1998
California CABG Outcomes Public Reporting Program (CCORP)	Li et al. 2010	Li et al. 2010
Georgia Partnership for Health and Accountability (PHA)		Rask et al. 2006
Hospital Quality Alliance (HQA)		Friedberg et al. 2009

Reporting initiative	Study of individual provider	Study of organisational provider
		Lindenauer et al. 2007
Hospital Quality Incentive Demonstration (HQID)		Drake et al. 2007
Missouri obstetrics consumer report		Longo et al. 1997
Quality Counts		Hibbard et al. 2003, 2005
UK Adult Cardiac Surgery Audit	Khan et al. 2007	
US ART Clinics		Bundorf et al. 2009
US News and World Report Hospital Rankings		Pope 2009
Ontario Cancer Care		Duvalko et al. 2009
Ontario ICES Atlas		Tu & Cameron 2003
Ontario, CABG		Guru et al. 2006
Ontario, EFFECT Study		Tu & Lauer 2009
NHS Star Rating		Mannion et al. 2005
France Infection Control Activity		Merle et al. 2009
Nursing Home Compare		Werner, Konetzka & Kruse 2009; Werner, Konetzka, Stuart et al. 2009 Werner et al. 2010 Mukamel et al. 2009 Stevenson 2006 Mukamel et al. 2008 Castle 2009a, b Zinn et al. 2008 Mukamel et al. 2007

A brief summary of each of the more commonly evaluated and/or significant initiatives is provided below.

Health Care Financing Administration (HCFA)

The HCFA initiative launched public disclosure of quality of care information. HCFA initially analysed mortality within 180 days of hospital admission for CABG surgery, adjusted for various factors, in relation Medicare patients, in all hospitals. The data were to be used by peer-review organisations and hospitals to assess quality of care. However, the news media were able to obtain and publicly disclose these data through Freedom of Information legislation. The initiative began in 1986, with the first published data occurring in 1987. The initiative ended in 1993 due to claims by HCFA that they were unable to reliably adjust the data to account for differences in patient characteristics.

New York State Cardiac Surgery Reporting System (NYS CSRS)

The CSRS began in 1989 as a voluntary data collection contributed by all hospitals in New York State, on all patients undergoing open heart surgery. The State Department of Health publicly released risk-adjusted mortality from CABG surgery in 1990 through the news media, initially concealing hospital names, but releasing them on the following day. Surgeon-specific information was not publicly released, but similar to the HCFA initiative, the news media successfully sued the Department for the public release of this information. This occurred in 1991, relating to the three years prior, for surgeons performing at least 200 isolated CABG operations within the time period.

The reports are ongoing, and are published on the Department's website. Apart from adult cardiac surgery, separate reports are available for percutaneous coronary intervention (PCI) and

paediatric congenital cardiac surgery. The latest available reports (i.e. in 2010) for adult cardiac surgery and PCI are related to 2005–2007. (The most current publicly available report relating to paediatric congenital surgery was released in 2007, relating to 2002–2005.) Statistics include: volume of cases, crude mortality rate, observed mortality rate, expected mortality and risk-adjusted mortality, and the 95% confidence interval (for risk-adjusted mortality), as well as flagging hospitals with significantly higher and lower than expected mortality.

Pennsylvania's Health Care Cost Containment Council (PHC4)

Pennsylvania's Health Care Cost Containment Council resulted from legislation passed in 1986 in the state to increase transparency and competition between health care providers. Public reporting began in 1993, with a two year time lag in data. Hospitals (175 at the time) with at least 100 beds were the subject of reporting and the reports initially showed number of patients admitted, the average severity of illness of those patients when admitted, the percentage of patients 65 years and older, the actual and expected number of deaths and complications, the average length of stay, and the hospital's average charge per client, for 52 diagnosis related groups.

The scheme was suspended in 1994 to concentrate on the single-condition Acute Myocardial Infarction (AMI) report released in 1996 and the single-procedure CABG report released in 1998. Regular reporting resumed in 1999, and is currently ongoing. The time lag for release of data is currently one year.

California CABG Outcomes Public Reporting Program (CCORP)

CCORP began as the California CABG Mortality Reporting Program (CCMRP), a voluntary program established in 1995 to collect and report CABG mortality data for participating California hospitals. It was established by the Office of Statewide Health Planning and Development (OSHPD) (a government department), in partnership with the Pacific Business Group on Health (PBGH), a statewide coalition of purchasers of care. CCMRP was later replaced by the mandatory heart bypass surgery reporting program (CCORP), which began reporting in 2003 and is currently ongoing.

Data are risk-adjusted, and include both in-hospital and 30 day mortality. The reports show observed and expected deaths, 95% confidence intervals, and an overall performance rating (better than expected, worse, or as expected) for each hospital. The 2007 report added hospital post-operative stroke rates. They are available through the OSHPD's website.

Nursing Home Compare

Nursing Home Compare was launched in 2002, by the Centers for Medicaid and Medicare Services (CMS) in the United States, as a website resource for people wanting to compare nursing homes. The online report uses a 'Five-Star Quality Rating System', which provides an overall rating of each nursing home on health inspections, staffing, and quality measures, and separate ratings for each of the three areas. Quality measures include long-stay prevalence measures (activities of daily living change, mobility change, high risk pressure ulcers, long-term catheters, physical restraints, urinary tract infection, pain), and short-stay prevalence measures (delirium, pain and pressure ulcers). In addition, the report shows the number of beds, type of ownership (e.g. for-profit, not-for-profit), and special focus of the facility (e.g. continuing care, retirement community, resident and family council).

Hospital Compare

Hospital Compare is a website resource for patients choosing a hospital, established as a collaborative effort by the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services (DHHS), along with the Hospital Quality Alliance (HQA) in the United States.

The Hospital Compare website compares results for each individual hospital with the average within its state and nationally, in relation to:

- Process of care measures: i.e. whether or not hospitals provide some of the care that is recommended for patients being treated for a heart attack, heart failure, pneumonia, asthma (children only) or patients having surgery
- Outcomes of care: 30 day risk-adjusted death rates for heart attack, heart failure and pneumonia and 30 day risk-adjusted rate of readmission
- Use of medical imaging: information about how hospitals use medical imaging tests for outpatients based on protecting patients' safety (e.g. keeping patients' exposure to radiation and other risks as low as possible), following up properly when screening tests such as mammograms show a possible problem and avoiding the risk, stress, and cost of doing imaging tests that patients may not need
- Results of surveys of patients' hospital experiences.

California Hospital Outcomes Project (CHOP)

The California Hospital Outcomes Project was established under legislation passed in 1991, by the Office of Statewide Health Planning and Development (OSHPD) in the State of California, United States. Reports are published annually, starting in 1993, and include risk-adjusted hospital outcomes for medical, surgical, and obstetric patients. The initial conditions selected were in-hospital mortality for heart attack (AMI), back surgery (cervical and lumbar disk excisions), and maternal outcomes and obstetrics care (vaginal and caesarean deliveries). Measures reported included in-hospital mortality within 30 days (AMI), reported post-operative complications (diskectomy, delivery), post-operative length of stay (diskectomy), and readmission within 6 weeks (delivery). Project reports were based on discharge abstracts submitted by hospitals and edited by OSHPD. The data were risk-adjusted. The last report from the initiative was published in 2002.

Greater Cleveland Health Quality Choice (GCHQC)

The CHCQ program was established as an initiative by business leaders in Cleveland, Ohio, United States, to contain rising health care costs. Collection of standardised data began in 1989, and reports were published in 1993. During the period of public reporting, the 30 independent hospitals that were the subject of reporting were amalgamated into two main groups. When one of the groups representing a third of the hospitals chose to pull out of public reporting in 1998, this resulted in the end of the program. Claims of exceptionally high administration costs (approximately \$US2 million per year for the nine hospitals in the group) were cited as the reason for the group's withdrawal.

QualityCounts

QualityCounts is an initiative of the Alliance, a not-for-profit, employer-owned health care purchasing cooperative in Madison, Wisconsin, United States.

QualityCounts began in 1999, comparing the performance of 24 hospitals. Indices of adverse events (deaths and complications) were reported for the two broad surgical and nonsurgical areas, and for three individual clinical areas—hip/knee replacements, cardiac care and maternity. The measures were adapted from the Health care Cost and Utilization Project (HCUP) Quality Indicators, and were adjusted using the Medstat disease staging methodology. Hospitals were rated on these indices as better than expected, as expected, or worse than expected.

The initiative is ongoing. In 2009, the Alliance integrated the QualityCounts reports into their online 'Find a Doctor' website resource, to provide members with information about quality and cost when choosing a provider.

Assisted Reproductive Technology (ART) Report

The ART report was established through legislation in 1992 mandating clinics performing ART to provide annual data on their procedures and success rates to the Centers for Disease Control (CDC). The CDC published the first report based on these data in 1997, which related to the 1995 time period. The reports published provide information on the success rates for each United States fertility clinic (i.e. the numbers of deliveries resulting in live births), as well as other supporting information, such as the type and number of cycles and the age distribution of women undergoing the procedures. The initiative is currently ongoing.

National Health Service (NHS) Star Rating

The NHS Star Rating system began as an initiative of the Commission for Health Improvement in the United Kingdom. The initiative was established to provide NHS staff and the public with easy to understand information about the performance of local health care services. The subjects of the ratings are NHS trusts, including acute care trusts (hospitals), primary care trusts, mental health trusts and ambulance trusts.

The system assigns trusts to one of four categories of performance:

- Three stars are assigned to trusts with the highest level of performance
- Two stars to those that are performing well overall, but have not quite reached the same consistently high standards
- One star to those where there is some cause for concern regarding particular areas of performance
- Zero stars assigned to those with the poorest levels of performance.

As well as providing the overall star rating to each trust, the reports also provide individual ratings and overall performance (pass/fail) against key targets, and ratings on balanced score card areas (high, medium, low).

The Health care Commission, an independent regulator of NHS performance, overtook the NHS star rating public reporting function in 2004, and in 2009, the Care Quality Commission replaced the Health care Commission and overtook this function. The Care Quality Commission continued the star rating system until as part of its 'annual health check' program. In 2010, it announced that it does not intend to publish an overall assessment of NHS providers on their performance from 2010-11 onwards, and that it was moving from quality ratings to a system of continuous assessment of compliance with essential standards.

Reporting systems evaluated in the literature – health plans

All studies of the impact of the public release of performance information on health plans have been United States-based studies (see Table 9). Eleven of the studies were undertaken within the context of employment based insurance. Nine of these concerned how choices between health plans made by employees were impacted by the availability for performance information. Two studies examined the behaviours of health plans themselves in relation to public disclosure of performance information.

Only one study included in the review examined Medicare beneficiaries' behaviours in terms of health plan choices following release of performance information. Two studies were of behaviours of Medicaid beneficiaries.

A further three studies were experimental studies in which the choices made by a sample of consumers were compared with and without performance information.

Table 10 presents an analysis of the types of performance information publicly released in relation to the included studies. In several of the studies more than one type of information was released. The main performance information systems examined in these studies were the Health Plan Employer Data and Information Set (HEDIS) measures, the Consumer Assessment of Health Plans (CAHPS) or other specific consumer assessment measures.

Table 9. Context for studies in which public release of health plan performance information has been studied

Context	Specific Scheme Studied	Studies	Number of Studies
Employment based insurance choices	Federal Employee Health Benefit guide	Jin and Sorenson 2006 Wedig and Tai-Seale 2002	11
	GM HMO Options Guide	Chernew et al. 2008/Scanlon et al. 2002	
	Harvard University employees	Beaulie 2002	
	Minnesota state employees	Knutson 1998	
	Private employer not identified	Chernew 1998 Hibbard 1997b (Employers) Scanlon 1999	
	Sample of employers	Gabel 1998	
	U.S. commercial health plans	Bost 2001 McCormick et al. 2002	
Medicare Advantage (Medicare HMOs)		Dafny 2008	1
Medicaid HMOs	Medicaid in Iowa	Farley et al. 2002	2
	Medicaid in New Jersey	Farley et al. 2002	
Hypothetical experiment		Booske 1999; Sainford 1996 Harris 2002 Spranca et al. 2000	3

A summary of the major quality measurement systems used in public release of health plan performance information studies included in this review follows.

HEDIS

HEDIS is a system of measures that has been developed by the National Committee for Quality Assurance (NCQA) in the United States since the mid 1990s. HEDIS incorporates a range of effectiveness of care measures and also consumer assessment of care measures, covering the broad areas of staying healthy, getting better, living with illness and doctor communication and services. A key focus of HEDIS is to leverage competitive forces to promote quality. The indicators are published and made available to purchasers of health insurance plans (mostly employers) and consumers. In the earlier 2000s, many government insurance plans, such as Medicare and Medicaid programs have made reporting of HEDIS measures mandatory, and there have been moves to extend HEDIS measures to other managed care and indemnity

insurance schemes. HEDIS is currently (2010) used by more than 90 percent of America's health plans to measure performance on important areas of care and service. HEDIS measures are published in a wide range of settings and websites, including the NCOA web site, which provides an on-line report card on all participating health plans (at <http://reportcard.ncoa.org/plan/external/plansearch.aspx>). As of 2010, over 70 measures are included in HEDIS (see Table 11), although fewer measures were reported in earlier versions.

Table 10. Quality measurement systems used in public release of health plan performance information studies included in review

Quality measurement system		Studies	Number of Studies
Health Plan Employer Data and Information Set (HEDIS) measures		Beaulie 2002 Booske 1999; Sainford 1996 Bost 2001 Chernew 1998 Chernew et al. 2008/Scanlon et al. 2002 Dafny 2008 Gabel 1998 Hibbard 1997b Jin and Sorenson 2006 McCormick et al. 2002 Scanlon 1999	11
Consumer Assessment of Health Plans (CAHPS) and other consumer rating systems	CAHPS	Booske 1999; Sainford 1996 Bost 2001 Dafny 2008 Farley et al. 2002a Farley et al. 2002b Harris 2002 Spranca et al. 2000	7
	Other consumer ratings systems	Chernew et al. 2008/Scanlon et al. 2002 Hibbard 1997b (Employers) Knutson 2002 Wedit and Tai-Seale 2002	4
Other		Hibbard 1997b	1

CAHPS

The CAHPS program is a public-private initiative to develop standardised surveys of patients' experiences with ambulatory and facility-level care. The program has been funded by the United States Agency for Health care Research and Quality (AHRQ), since the mid 1990s. Through the program, a family of consumer experience services survey instruments have been developed and implemented in a wide variety of setting in the United States. The survey instruments are principally focused on consumer experience of health plans, but have been expanded to address a broad range of issues.

Table 11. Health Plan Employer Data and Information Set (HEDIS) measures, 2011

HEDIS 2011 measures	
Effectiveness of care	Effectiveness of care (cont)
Adult BMI assessment	Aspirin use and discussion
Weight assessment and counselling for nutrition and Physical activity for children/adolescents	Flu shots for adults aged 50–64 yrs
Childhood immunisation status	Flu shots for older adults
Immunisations for adolescents	Medical assistance with smoking and tobacco use cessation
Lead screening in children	Pneumonia vaccination status for older adults
Breast cancer screening	
Cervical cancer screening	Access/Availability of Care
Chlamydia screening in women	Adults/ access to preventive/ambulatory health services
Glaucoma screening in older adults	Children's and adolescents' access to primary care practitioners
Care for older adults	Annual dental visit
Appropriate testing for children with pharyngitis	Initiation and engagement of alcohol and other drug dependence treatment
Appropriate treatment for children with upper respiratory infection	Prenatal and postpartum care
Avoidance of antibiotic treatment in adults with acute bronchitis	Call abandonment
Use of spirometry testing in the assessment and diagnosis of chronic obstructive pulmonary disease (COPD)	Call answer timeliness
Pharmacotherapy of COPD exacerbation	
Use of appropriate medications for people with asthma	Satisfactory with the experience of care
Cholesterol management for patients with cardiovascular conditions	CAHPS Health Plan Survey 4.0H, Adult version
Controlling high blood pressure	CAHPS Health Plan Survey 4.0H, Child version
Persistence of beta-blocker treatment after a heart attack	Children with chronic conditions
Comprehensive diabetes care	
Disease-modifying anti-rheumatic drug therapy for rheumatoid arthritis	Use of services
Osteoporosis management in women who had a fracture	Frequency of ongoing prenatal care
Antidepressant medication management	Well-child visits in the first 15 months of life
Follow-up care for children prescribed attention deficit hyperactivity disorder (ADHD) medication	Well-child visits in the third, fourth, fifth and sixth years of life
Follow-up after hospitalisation for mental illness	Adolescent well-care visits
Annual monitoring for patients on persistent medications	Frequency of selected procedures
Medication reconciliation post-discharge	Ambulatory care
Use of high risk medications in the elderly	Inpatient utilisation–General hospital/acute care
Fall risk management	Identification of alcohol and other drug services
Management of urinary incontinence in older adults	Mental health utilisation
Osteoporosis testing in older women	Antibiotic utilisation
Physical activity in older adults	Plan all-cause readmissions

Source: NCQA 2011

Other reporting systems

A number of countries now have well-established comparative information on the performance of organisational and individual health care providers available on line. A survey by Damman et al.(2010) undertaken in 2008 and published in 2010 identified 42 web-based reporting systems in 10 countries (see Appendix 8 for its listing). The objective of the study was to assess the current state of the art presentation of online comparative health care information and to compare how the integration of different information types is dealt with on websites.

The study found that most of the reporting systems identified were United States-based, although the Netherlands, Germany and the United Kingdom also had multiple sites. Most were aimed at providing consumers with information about the performance of health care providers and assisting them in choosing a provider. Other interesting findings were:

- Health care sectors: Hospitals were the focus of 32 websites. The remainder were related to nursing homes/home care and health plans.
- Types of information: Thirty-seven websites presented quality information based on performance indicators. Twenty-two websites contained quality information based on health care users' experiences.
- Integration of information: Seventeen websites had a high level of integration of different information types, that is, presenting different type of quality information about the provider in a single table. Twenty nine provided drill-down paths for the information presented in the initial screen.
- Information display: Numbers and/or words were used in most instances to display comparative information (37 and 32 websites respectively). Symbols, such as stars and round icons, were also commonly used (15 and 10 websites respectively). Bar charts were also used to present quality information (18 websites).

The authors concluded that approaches to presenting comparative health information by different web-based reporting systems do not seem to be systematic, and discussed some research relating to the effectiveness of different approaches (e.g. use of numbers over words, use of tables, level of integration of information). However, no firm conclusions are drawn and further research on how information can be more effectively presented to consumers was suggested.

4 Analysis of Studies

This chapter gives the results of the review of evidence of the impacts of public disclosure of performance information by reporting subject, that is, individual health care providers, organisational providers and health plans.

Results - individual providers

We identified two more recent studies to add to those identified for the Chen review (Epstein 2010; Li et al. 2010). We also included two studies from the Marshall and Schauffler reviews which had not been included in either of the Fung or Chen reviews (Schneider & Epstein 1998; Hannan et al. 1997).

We excluded two studies concerned with individual providers which had been included in both the Marshall or Schauffler reviews but not the Fung or Chen reviews (Hibbard & Weeks 1989; Sorokin 2000).

Overall 14 responses to public release of performance information on individual providers (see Table 12). Thirteen of these were United States-based studies and one was a United Kingdom study. Eight were studies of the NYS CSRS and one of the New York PCI Reporting System. Three studies concerned the initiatives of the Pennsylvania Health Care Cost Containment Council (PHC4).

All but one of the individual provider studies focused on cardiac surgery. The one other study was of a public release of individual provider information PCI.

Selection/allocative efficiency

Several of studies of the NYS CSRS found that surgeons with poorer outcomes were more likely to cease practice following the introduction of the system (Hannan et al. 1995; Jha & Epstein 2006).

One study found evidence that ratings influenced patients' choice of surgeon (Mukamel et al. 2004). Another study of patients receiving cardiac surgery in Pennsylvania (Schneider & Epstein 1998) found only limited evidence that patients were aware of information on surgeon outcomes and had used this in forming their decisions.

Two studies, one of the NYS CSRS (Hannan et al. 1997) and one of the Pennsylvanian system (Epstein 2010) found no evidence that referring cardiologists had changed their referral patterns.

Another study of the NYS CSRS found that managed care health plans did take surgery outcomes into account in their contracting decisions, although this was principally in terms of increasing the likelihood of contracting with surgeons with very good outcomes (high outliers) rather than not contracting with surgeons with poor outcomes (Mukamel et al. 2000; Mukamel et al. 2002).

Table 12. Studies examining publicly released quality information on individual providers

Reporting Initiative	Study	Global rating	Selection	Allocative efficiency	Quality improvement	Clinical outcomes	Technical efficiency	Unintended consequences
NYS CSRS	Burack et al. 1999	√		↑				↓
	Hannan et al. 1995	√√	↑	↑		↑		
	Jha & Epstein 2006	√√	↑	↑				
	Mukamel et al. 2004	√√	↑	↑				↓
	Werner et al. 2005	√√√						↓
	Mukamel et al. 2000 Mukamel et al. 2002	√√	↑	↑				
	Mukamel & Mushlin 1998	√					↓	
	Hannan et al. 1997	√	↔					
New York PCI Reporting System	Narins et al. 2005	√		↑				↓
Pennsylvania Health Care Cost Containment Council (PHC4)	Epstein 2010	√√√	↔	↔				
	Schneider & Epstein 1996	√						↓
	Schneider & Epstein 1998	√	↔	↔				
California CABG Outcomes Public Reporting Program (CCORP)	Li et al. 2010	√√	↔			↔		↔
UK Adult Cardiac Surgery Audit	Khan et al. 2007	√√				↑		↑

One potentially negative aspect of ‘selection’ decisions is the decisions by surgeons or physicians not to operate on patients whose risks of mortality are higher. Whether this is a negative outcome can be debated. It could be argued there is a tendency for modern health systems to offer interventions even where these have little likelihood of good outcomes. On the other hand it could be argued that these responses reduce access to surgery for relatively sicker patients. Four studies have examined this issue.

Schneider and Epstein 1996 found that following the introduction of public reporting in Pennsylvania 59% of cardiologists reported increased difficulty finding surgeons willing to perform CABG in severely ill patients who required it; 63% of cardiac surgeons reported being less willing to operate on such patients. In a cross sectional survey conducted in 1997, which was well after the introduction of public reporting, Burack et al. 1999 found that 62% of cardiac surgeons in NY State reported that they had refused to operate on ≥1 high risk CABG patient over the preceding year, primarily because of public reporting. In another cross sectional survey, Nairns et al. 2005 reported that 79% of interventional cardiologists agreed or strongly agreed that public reporting influenced their decision on whether to perform angioplasty on individual patients and critically ill patients with high expected mortality rates.

In contrast, Li et al. 2010 analysed the of hospitals providing cardiac surgery in California before and after the introduction of a public reporting initiative. The authors found no evidence that there was a change in the complexity of patients receiving surgery.

We conclude that there is some evidence that public reporting on individual providers has resulted in selection and allocative efficiency improvements. These principally relate to decisions by individual providers with relatively poor outcomes to exit the market.

Quality improvement

No studies of individual providers have examined quality improvements activities arising from public reporting of quality information on individual providers.

Whilst not specifically reporting on quality improvement processes, Khan et al. 2007 found that, certain practices changed in response to release of surgeon level data, which may be indicative of quality improvement processes. Specifically, there was a significant reduction in the proportion of certain cardiac procedures performed by trainee surgeons and also a significant decline in the proportion of cases performed by the trainees without consultant supervision.

It could be argued that studies of quality improvement responses to organisation provider reporting are relevant where there is concurrent release of hospital and individual surgeon outcomes (such as the NYS CSRS). These are discussed in the next section, where it is concluded that there is reasonably strong evidence that public release stimulates quality improvements activities. There are two studies relevant in this context. Chassin 2002 reported on a range of increased quality improvement activities in response to the NYS CSRS such as staffing policy changes, multidisciplinary approach to examining care processes, and changes in operating room schedule. An earlier study by Dziuban et al. 1994 reported on the quality improvements responses of one high mortality hospital to the NYS CSRS.

We conclude that there is little evidence that public reporting on individual providers has stimulated quality improvement activities. Some of the evidence to date concerns the response of hospitals where there has been simultaneous release of individual and organisational provider information.

Clinical outcomes

Three studies have examined the potential impact on clinical outcomes. Hannan et al. 1994 found a proportionately larger decrease in risk-adjusted mortality for low-volume surgeons as a result of the NYS CSRS. This was principally a result of the exit of high mortality surgeons from clinical practice and an influx of low mortality surgeons. Li et al. 2010 found mixed evidence in relation to the Californian initiative on cardiac surgery. They found that despite similar patient characteristics, the operative mortality for patients in the highest risk group was 26% lower in 2006 than in 2003 (although there was no control in the study with which to compare this trend). Among surgeons with higher risk-adjusted mortality rates, there was a trend toward a lower operative mortality, although the majority of surgeons who performed CABG in both 2003 and 2006 had reductions in their risk-adjusted mortality rates.

Khan et al. 2007 studied the impact of release of cardiac surgeon level information in the United Kingdom. Whilst not a direct measure of outcomes, and perhaps indicative of quality improvement processes, the authors found there had been a significant reduction in the proportion of certain cardiac procedures performed by trainee surgeon and also a significant decline in the proportion of cases performed by the trainees without consultant supervision.

As with quality improvement, it could be argued that some of the studies of clinical outcomes for organisation provider reporting are relevant where there is concurrent release of hospital and individual surgeon outcomes (such as the NYS CSRS). These studies (Peterson et al. 1998; Ghali et al. 1997; Hannan, Kilburn Jr et al. 1994; Hannan, Kumar et al. 1994; Dziuban Jr et al. 1994; Dranove et al. 2003; Moscucci et al. 2005 and Hollenbeak et al. 2008) are discussed in the next section.

We conclude that there is limited evidence that public reporting on individual providers has resulted in improved clinical outcomes. Some of the evidence to date concerns the response of hospitals where there has been simultaneous release of individual and organisational provider information.

Technical efficiency

One study examined the impact of public reporting on costs (Mukamel & Muskin 1998). It found that physicians with better outcomes had higher rates of growth of charges. There was no discussion of overall cost impacts of the initiative for the health system.

We conclude that there is no evidence concerning the impact of public reporting on individual providers on costs of clinical services.

Unintended consequences

Several studies have examined unintended consequences of public release of individual provider information. The main 'negative' impact studied in that public reporting may lead to decisions by surgeons or physicians not to operate on patients where risks of mortality are higher. This issue was discussed previously.

A related aspect of these impacts is evidence that access to services for particular groups in society is reduced. Mukamel et al. 2004 found that in the post-report period for the New York system, patients from more affluent and more educated neighbourhoods were more likely to be treated by low mortality surgeons, and patients from lower socioeconomic neighbourhoods were more likely to be treated by high mortality surgeons. Werner et al. (2005) examined racial and ethnic disparity in CABG use in New York immediately after implementation of the New York system. They found in the period immediately following implementation, disparities increased, but they did not change in the comparison states. The disparities decreased to levels similar to report card pre- release levels over time. No increase in disparities could be found for related services (PCI) after the CABG report card was released. Li et al. 2010 found no evidence of decreased access to CABG for high risk patients in California during the period of public reporting of isolated CABG outcomes.

We conclude that there is evidence that a predictable response for public release of quality information on individual providers may be that providers avoid high risk patients, and that this may exacerbate health care access problems for more vulnerable groups. These impacts could be ameliorated by monitoring and better risk adjustment systems. However, this issue may also require public awareness and debate.

Results - organisational providers

We identified four more recent studies to add to those identified for the Chen review (Castle 2009a, b; Mukamel et al. 2007; Stevenson 2006; Dranove & Sfekas 2008). We also included two studies from the Marshall and Schauflier reviews which had not been included in either the Fung or Chen reviews (Schneider & Epstein 1998; Maxwell 1998; Berwick & Wald 1990).

We excluded four studies concerned with organisational providers which had been included in the Marshall or Schauflier reviews but not the Fung or Chen reviews (Romano et al. 1999; US General Accounting Office 1994; Jewett & Hibbard 1996; Wakefield et al. 1996). We also excluded seven studies included in the Chen review related to organisational providers (Sullivan et al. 2006; Stewart 2006; Jha et al. 2009; Levy et al. 2007; Mazor & Dodd 2009/Mazor et al. 2009;

Kritchevsky et al. 2008; Peters et al. 2007). Reasons for exclusion are set out in Appendix 2. There were two principal reasons for exclusion: either the study didn't actually involve public release of information, or the study was of consumer's responses or comprehension but not in a choice experiment.

We added the Duvalko et al. 2009 study to the organisational provider analysis (previously included under health plans by Chen). We also decided to treat Baker et al. 2002 and Baker et al. 2003 as one study.

Overall 46 studies of responses to public release of performance information on organisational providers were identified (see Appendices 4A and 4B and Table 13). Forty of these were United States based studies, four were studies of initiative in Ontario Canada, and one was a United Kingdom study and one was a study from France.

Of the studies on organisational providers, multiple studies were conducted on seven of the 22 systems. The most frequently assessed systems were:

- The NYS CSRS, which was the focus of 11 studies (including two comparing the impacts of reporting with those of another system). There was also an additional study on the PCI Reporting System
- Pennsylvania Health Care Cost Containment Council (PHC4), which was the focus of five studies (including one comparing outcomes with NYS CSRS)
- Greater Cleveland Health Quality Choice (GCHQC), which was the focus of four studies
- The California Hospital Outcomes Project (CHOP) was the focus of three studies, as was the HCFA hospital-specific mortality rates (one comparing reporting outcomes with the Cardiac Surgery Reporting System)
- The Hospital Quality Alliance (HQA) was the focus of two studies
- Nursing Home Compare, which was the focus of six studies.

The majority of studies were of public release information about hospital based care, except for the six studies of the Nursing Home Compare system and a study of assisted reproductive technology clinics.

Two of the studies solely assessing the NYS CSRS had high global ratings. While one reported a positive effect in relation to clinical outcomes, the other reported no change, and no change was reported on allocative efficiency and unintended consequences, which were the two other dimensions assessed. A third study with high ratings compared the effects of public reporting of the NYS CSRS and the PHC4. This study reported negative effects in relation to all dimensions studied, which were: clinical outcomes, allocative efficiency, technical efficiency and unintended consequences.

One of the six studies assessing the effects of the Nursing Home Compare system had a high global rating. This study reported positive effects for the two dimensions studied—selection and clinical outcomes.

Two of the five studies of PHC4 had high global ratings. One of these was the one mentioned earlier comparing its effects with those of the NYS CSRS, which showed negative effects in relation to clinical outcomes, allocative efficiency, technical efficiency and unintended consequences. The other studied only clinical outcomes and showed mixed results.

Selection/allocative efficiency

Seventeen studies examined selection effects of public release of organisational provider quality information. Ten of these studies found no effects on selection and one showed mixed results. Six found positive effects (that is, better quality hospitals, nursing homes or clinics attracted higher market share).

Of the 15 studies, 13 were concerned with hospitals and three with nursing homes. Five of the hospital studies involved the NYS CSRS. These generally found no effect on market share for hospitals with higher or lower rankings (Jha & Epstein 2006; Chassin 2002; Hannan, Kilburn Jr et al. 1994; Hannan, Kumar et al. 1994). In contrast Mukamel & Mushlin 1998 found hospitals in New York State with better outcomes experienced higher rates of growth in market share. Romano & Hong 2004 studied both the New York and Californian systems and found different results for different types of procedures.

Dranove et al. 2003 found evidence that report cards led to increased sorting of patients to providers on the basis of the severity of their illness. As a result teaching hospitals in New York and Pennsylvania picked up an increasing share of patients with more severe illness.

Table 13. Studies examining publicly released quality information on organisational providers

Reporting Initiative	Study	Global rating	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
HCFA hospital-specific mortality rates	Mennemeyer et al. 1997	√√	↔			↔		
	Vladeck et al. 1988	√	↔			↔		
	Berwick & Wald 1990	√		↑				
NYS CSRS	Dranove & Sfekas 2008	√√	↑			↑		
	Peterson et al. 1998	√√√			↑	↔		↔
	Ghali et al. 1997	√√√			↔			
	Jha & Epstein 2006	√√	↔			↔		
	Chassin 2002	√√	↔	↑		↔		
	Omoigui et al. 1996	√√				↑		↓
	Hannan, Kilburn Jr et al. 1994 Hannan, Kumar et al. 1994	√√	↔		↑	↔		
	Mukamel & Mushlin 1998	√√	↑			↑		
	Dziuban Jr et al. 1994	√		↑	↑			
And Pennsylvania Health Care Cost Containment Council (PHC4) And California Hospital Outcomes Project (CHOP)	Dranove et al. 2003	√√√	↓		↓	↓	↓	↓
	Romano & Hong 2004	√√	↑↓			↑↓		
	Moscucci et al. 2005	√√			↔			↓
New York PCI Reporting System	Hollenbeak et al. 2008	√√√			↑			
Pennsylvania Health Care Cost Containment Council (PHC4)	Bentley & Nash 1998	√		↑		↑		
	Schneider & Epstein 1998	√	↔			↔		
	Maxwell 1998	√					↔	

Reporting Initiative	Study	Global rating	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Greater Cleveland Health Quality Choice (GCHQC)	Baker et al. 2002 Baker et al. 2003	√√	↔		↔	↔		↑↓
	Clough et al. 2002	√√			↔			
	Rosenthal et al. 1997	√√			↑			
	Rosenthal et al. 1998	√		↑				
California Hospital Outcomes Project (CHOP)	Luce et al. 1996	√		↔				
	Rainwater et al. 1998	√		↔				
California CABG Outcomes Public Reporting Program (CCORP)	Li et al. 2010	√√	↔		↔			↔
Georgia Partnership for Health and Accountability (PHA)	Rask et al. 2006	√		↑	↑			
Hospital Quality Alliance (HQA)	Friedberg et al. 2009	√√						↔
	Lindenauer et al. 2007	√√√			↑			
Hospital Quality Incentive Demonstration (HQID)	Drake et al. 2007	√√			↑↓			↓
Missouri obstetrics consumer report	Longo et al. 1997	√√		↑	↑	↑		
Quality Counts	Hibbard et al. 2003, 2005	√√√	↔	↑	↑	↔		
US ART Clinics	Bundorf et al. 2009	√√	↑			↑		
US News and World Report Hospital Rankings	Pope 2009	√√	↑			↑		
Ontario Cancer Care	Duvalko et al. 2009	√						
Ontario ICES Atlas	Tu & Cameron 2003	√		↑				
Ontario, CABG	Guru et al. 2006	√√√			↔			
Ontario, EFFECT Study	Tu & Lauer 2009	√√√		↑↓	↑↓			
NHS Star Rating	Mannion et al. 2005	√				↑		↓
France Infection Control Activity	Merle et al. 2009	√	↑			↑		
Nursing Home Compare	Werner, Konetzka & Kruse 2009 Werner, Konetzka, Stuart et al. 2009 Werner et al. 2010	√√√	↑		↑			
	Mukamel et al. 2009	√√						↔
	Stevenson 2006	√√	↔					
	Mukamel et al. 2008	√√			↔			
	Castle 2009a, b	√	↑					
	Zinn et al. 2008	√		↑				
	Mukamel et al. 2007	√		↑				

Almost all studies of other hospital reporting systems have found no impact on market share. There are two main exceptions. Pope 2009 examined the impact of the US News and World Report Hospital Rankings system, a well established initiative in the United States. The author found hospitals that improve their rank are able to attract significantly more patients. The average hospital in the sample experienced a 5% change in non-emergency, Medicare patient volume from year to year due to rank changes. Bundorf et al. 2009 studied the impact of public reporting of outcomes for assisted reproductive clinics across the United States.

Three studies have examined the selection effects for the Nursing Home Compare system. In a series of papers studying this system Werner and colleagues (Werner, Konetzka & Kruse 2009; Werner, Konetzka, Stuart et al. 2009; Werner et al. 2010) found improvements in measured quality after the initiation of public reporting were due to both nursing home-specific quality improvements and changes in market share, that is facilities with better outcomes attracting more residents. Castle 2009a, b found that 31% of consumers used the Internet when choosing a nursing home, and 12% recalled using Nursing Home Compare, suggesting that the system plays an important role in selection decisions. In general, the comprehension index scores for consumers were high, indicating good understanding of the information presented. In the third study, Stevenson 2006 concluded that the effect of Nursing Home Compare on public nursing home occupancy has been minimal.

We conclude that there is only limited evidence that public reporting on organisational providers (hospitals or nursing homes) has resulted in selection and allocative efficiency improvements. A recent study (Pope 2009) of a well established reporting system with wide use across the United States provides some evidence that hospital rankings have a material impact on consumer choices. However, more evidence is required to be confident in this conclusion.

Quality improvement

Fourteen studies examined the impact of public release of organisational provider quality information on quality improvement activities. Twelve of these studies found positive effects on quality improvement and two studies found no evidence of increased quality improvement activities.

All but three of these studies did not have a control group for comparison. One study with controls (Hibbard et al. 2003, 2005) found an increase in quality improvement effects. This study compared hospitals where data had been publicly released, with hospitals where data had been fed back to hospitals without public release, and hospitals which received no feedback. In areas where there were public or private reports (maternity and cardiac care), public report hospitals reported a higher number of quality improvement activities (3.4 obstetrics, 2.5 cardiac) compared with private report hospitals (2.5 obstetrics, 1.5 cardiac) and no report hospitals (2.0 obstetrics, 1.4 cardiac). Differences were statistically significant. The study suggests public reporting has an impact over and above the provision of feedback to hospitals.

Other study with controls was the EFFECT study reported on by Tu & Lauer (2009). This study compared quality improvement activity between hospitals that had had early feedback of quality information (12 process-of-care indicators for AMI and 6 for CHF) which was also publicly released, and hospitals which did not participate until a later time period. Hospitals were randomly assigned to early feedback and late feedback groups. In addition to analysing the impact on the process of care indicators, the investigators conducted a survey of participating hospitals regarding quality improvement initiatives launched in response to the early feedback report cards. Hospitals in the early feedback group were significantly more likely to report starting 1 or more quality improvement initiatives (73.2% of early feedback group vs. 46.7% of delayed feedback group for AMI care and 61.0% of early feedback group vs. 50.0% of delayed feedback group for CHF care in response to the publicly released early feedback report card. The nature and focus of the activities varied considerably by hospital. Approximately half of the early

New York decreased more than in other states. In their study which did not use controls, Hannan and colleagues (Hannan, Kilburn Jr et al. 1994/Hannan, Kumar et al. 1994) concluded risk-adjusted mortality rates in New York State decreased from 4.17% to 2.45% across all hospitals. Reductions occurred especially among hospitals that had the highest initial mortality rates. They also found there was convergence in mortality rates among hospitals initially identified as high, medium and low performers. Dziuban et al. 1994 described the experience of one hospital and found excess mortality was related to a small set of high-acuity emergency patients. The staff responded with a focused effort to optimise the management of these patients, resulting in zero mortality for emergency coronary artery bypass grafting during the following year.

Ghali et al. 1997 concluded there was no evidence of improved clinical outcomes from the NYS CSRS. They found risk-adjusted mortality reductions in Massachusetts (without public reporting) were similar to mortality reduction in New York and northern New England. They also concluded unadjusted mortality trends were similar in Massachusetts, New York, northern New England, and the United States.

Dranove et al. 2003 studied the effects of the NYS CSRS and the PHC4 compared with some other states. Their study found important differences in impacts for less severely and more severely ill patients. Through their analysis they concluded there was statistically marginal evidence that the average mortality rate increased in New York and Pennsylvania compared with other states. They also found that for more severely ill patients there was an increase in the average rate of readmission for heart failure, but for less severely ill patients there was a decline in readmission.

Results from studies of other reporting systems are mixed. Hibbard et al. 2003, 2005 in their comparison of public, private and no reporting (see discussion above) found that for obstetrics measures, around one-third of hospitals in the public report group significantly improved their performance, while only 5% declined. Around 25% of private report hospitals showed a significant increase and 14% declined. Around 12% of no report hospitals significantly improved their performance and around 12% declined. Overall public report hospitals were 32% more likely to report improvements compared with private report hospitals and almost three times more likely than compared with no report hospitals. Results for cardiac care mirrored those for obstetrics but failed to reach statistical significance.

Lindenauer et al. 2007 compared outcomes for common conditions (AMI, CHF, hemorrhagic stroke, ischemic stroke, pneumonia and sepsis) for patients treated at hospitals which were operating in an environment of intensive public reporting (in Pennsylvania and other states). Patients treated in the intensive public reporting environment had significantly reduced odds of in-hospital mortality when compared with propensity score matched patients from hospitals in more limited public reporting environments. Furthermore, Pennsylvania patients showed significant improvement in their odds of in-hospital mortality in 2000–2003 when compared with Pennsylvania patients in 1997–1999.

Guru et al. 2006 found that risk-adjusted 30 day mortality rate in Ontario decreased 29% from the era of no reporting (1991–1993) to confidential reporting (1994–1998). There was no further decrease with public reporting (1999–2001). In-hospital mortality fell significantly faster in Ontario during the period of confidential reporting than in other parts of Canada.

The Ontario based EFFECT study (Tu & Lauer 2009) discussed previously found that, although there was no statistically significant difference in process of care indicators as a result of public reporting, clinical outcomes were improved. After adjusting for the baseline mortality rates, the mean 30 day AMI mortality rates were 2.5% lower in the early feedback group compared with the delayed feedback group the mean 1-year CHF mortality rates were 2.8% lower.

Four other hospital based studies found evidence of improved clinical outcomes (Rosenthal et al. 1997; Rask et al. 2006; Longo et al. 1997; Tu & Cameron 2003) and four other hospital based

studies were unable to find evidence of improved clinical outcomes (Moscucci et al. 2005; Baker et al. 2002/Baker et al. 2003; Clough et al. 2002; Li et al. 2010).

One set of studies of the impact of the Nursing Home Compare system found evidence of improved outcomes (Werner, Konetzka & Kruse 2009; Werner, Konetzka, Stuart et al. 2009; Werner et al. 2010) and one study was not able to demonstrate improved outcomes (Mukamel et al. 2008).

We conclude that there is some evidence that public reporting on organisational providers (hospitals or nursing homes) leads to improved clinical outcomes, but this conclusion requires further study. Four out of seven higher quality studies concluded there was evidence of effects on clinical outcomes.

Technical efficiency

Two studies have examined impacts of public reporting on costs or charges. Dranove et al. (2003) in their study of the NYS CSRS and the PHC4 found that Medicare costs increased as a result of public reporting. The increase in costs occurred as a result of the way in which more severely ill patients were managed. They concluded that more severely ill patients tended to receive cardiac surgery or interventions less often as a result of public reporting, but this was substituted for more costly in-patient care, exacerbated by higher rates of readmission. Another impact was that more severely ill patients tended to be referred to teaching hospitals.

Maxwell (1998) surveyed hospital executives affected by the PHC4 system in Pennsylvania, which included public information on hospital charges. A significant trend towards a reduction in the dispersion of hospital charges was not observed during the study period. Most hospital executives assigned low ratings of importance to published information on comparative charges; however, executives of high-competition hospitals assigned significantly higher importance ratings to the information as a whole, encouraging hospital competition based on quality.

We conclude that there is no evidence concerning whether public reporting on organisational providers (hospitals or nursing homes) leads to improved technical efficiency or reduced costs.

Unintended consequences

There are 12 studies that have examined other or unintended consequences. One of the key concerns has been whether public reporting leads to selection of patients by provider organisations (or clinicians working in these organisations) with a reduction in access for more severely ill patients or patients from disadvantaged social groups. Four studies have examined aspects of this issue, with two finding significant unintended impacts and two finding no evidence of these effects.

Dranove et al. 2003 found more severely ill patients had less access to surgery and other interventions following the NYS CSRS and PHC4 (see discussion above). Omoigui et al. 1996 found some evidence that patients from New York receiving CABG out of state at the Cleveland Clinic had higher expected mortality than the New York state-wide mix, suggesting the NYS CSRS lead to more severely ill patients seeking treatment or being referred to outside the state. Moscucci et al. (2005) found significant differences between patients undergoing PCI in Michigan (without public reporting) and New York (with public reporting), suggesting a propensity in New York toward not intervening on high risk patients.

Peterson et al. 1998 found that, as a result of the NYS CSRS, New York patients with AMI were less likely to receive CABG than those admitted outside New York. However, the overall percentage increased, paralleling national trends, even among higher risk elderly subsets; out-of-state CABG rates decreased. Li et al. 2010 analysed the of hospitals providing cardiac surgery in California

before and after the introduction of a public reporting initiative. The authors found no evidence that there was a change in the complexity of patients receiving surgery.

Two other studies included under individual providers may also be important here, as the NYS CSRS concurrently report individual surgeon and hospital results. As discussed above Mukamel et al. 2004 found that in the post-report period for the NYS CSRS, patients from more affluent and more educated neighbourhoods were more likely to be treated by low mortality surgeons, and patients from lower socioeconomic neighbourhoods were more likely to be treated by high mortality surgeons. Werner et al. (2005) found in the period immediately following implementation of NYS CSRS, socio-economic disparities in access to surgery increased, but they did not change in the comparison states.

A range of other unintended consequence has been identified. Friedberg et al. (2009) studied the impact of publicly reporting hospital scores on antibiotic timing in pneumonia cases and found that despite concerns, public reporting of hospital antibiotic timing scores has not led to an increase in pneumonia diagnoses, antibiotic use or a change in patient prioritisation. In a study of the impact of the same measure under the Hospital Quality Incentive Demonstration (HQID), Drake et al. (2007) found that increased success in meeting the pneumonia antibiotic timing measure correlates to an increase in pneumonia antibiotic use among the conditions selected (which do not call for antibiotic use).

In a study of the English NHS star rating system which involved staff at four low-performing hospital trusts and two high-performing hospital trusts, Mannion et al. (2005) founds ratings transmitted important priorities from central government and helped to direct and concentrate front-line resources. However public reporting also led to tunnel vision, distortion of clinical priorities, and disincentive to improve performance among high-rated organisations.

We conclude that there is evidence that public reporting on organisational providers (hospitals or nursing homes) can have unintended impacts and that these issues should be addressed in the design and monitoring of reporting systems. With public reporting providers may avoid high risk patients and that this may exacerbate health care access problems for more vulnerable groups. These impacts can be ameliorated by monitoring and better risk adjustment systems. However, this issue may also require public awareness and debate.

Results - health plans

We identified no more recent studies compared with the Chen review. We included six studies from the Marshall and Schauflier reviews which had not been included in either the Fung or Chen reviews (Gabel et al. 1998; Hibbard et al. 1997; Chernew & Scanlon 1998; Scanlon & Chernew 1999; Knutson et al. 1998).

We excluded two studies that Chen had included in his review (Landon et al. 2008, as this was not a study of the impact of public reporting; and Uhrig et al. 2006, as this was a study of comprehensibility of consumer material presented in an experimental situation). We also reclassified one study Chen had identified as a study of plans to a study of organisational providers (Duvalko et al. 2009). We excluded 13 studies concerned with health plans which had been included in either the Marshall or Schauflier reviews but not the Fung or Chen reviews.

Overall, 14 studies of actual responses to the public release of performance information on health plans were identified, and three further experimental studies were also identified (see Appendices 5A and 5B). All studies were United States based studies.

Selection/allocative efficiency

Of the included studies 12 studied the impacts of public release of information on selection, principally selection of health plans. A further three experimental studies examined selection in relation to hypothetical situations. We assumed positive findings on selection reflected improvements in allocative efficiency, that is with all things being equal, evidence that consumers' selection of higher quality plans reflects improved allocative efficiency. A small number of studies also estimated other aspects of allocative efficiency, as the implied price consumers are willing to pay for quality information.

Overall six studies found evidence that consumers choose high quality plans when information is provided and six studies were unable to find evidence consumers changed their choices as a result of provision of quality information.

Two studies of Medicaid populations (Farley, Short et al. 2002; Farley, Elliott et al. 2002) were randomised controlled trials, but were allocated a relatively lower global rating (v) due to the nature of the population studied. These studies found no evidence of selection effects.

There has been one study of the impact of quality information on selection effects in relation to Medicare Advantage, through which United States Medicare beneficiaries can choose health plans as an alternative to the more usual fee for service system (Dafny & Dranove 2008). This study found that public release of information had an effect on consumers' choice of higher quality plans, over and above the impacts of a broader range of information sources available to consumers. The impacts were greatest where differences in quality between plans were greatest. The authors estimate that around 12% of beneficiaries who had chosen the health plan alternative switched plans in any one year and around 3% of all Medicare beneficiaries.

All other studies examined choices either by consumers or purchasers made in the context of employment based insurance. These studies provide mixed results. Two papers related to the same study of plan enrolment decisions by non-union employees of General Motors (GM) in the mid-1990s (Chernew et al. 2008; Scanlon et al. 2002). They found the release of health plan rating had a statistically significant effect on health plan choices, but the effects were modest. Around 3% of people switched plans as a result of the release of ratings. Other studies that found significant impacts on selection have generally found relatively modest effects (Beaulieu 2002; Wedig & Tai-Seale 2002; Jin & Sorensen 2006). Several generally earlier studies found no impacts on selection.

One issue found to be common in two studies was that the avoidance of low quality plans is more important than selection of the highest quality plans (Scanlon et al. 2002; Beaulieu 2002). Actual switching of plans by consumers is generally very low (Chernew et al. 2008; Scanlon et al. 2002; Jin & Sorensen 2006).

Chernew et al. (2008) estimated the implied value on the information provided through the report cards for GM employees to be around \$20 per person. Jin & Sorensen (2006) estimated value of quality information provided to Federal employees to be \$US3.39 per person.

Table 14. Studies examining real world impacts of publicly released quality information on plans on selection and allocative efficiency

Study	Global rating	Context	Measures system	Selection	Allocative efficiency
Dafny & Dranove 2008	√√√	Medicare Advantage (Medicare HMOs)	HEDIS measures and CAHPS	↑	↑
Chernew et al. 2008 Scanlon et al. 2002	√√	Employment based insurance choices	HEDIS and patient satisfaction ratings	↑	↑
Farley, Short et al. 2002	√√	Medicaid HMOs	CAHPS	→	→
Farley, Elliott et al. 2002	√√	Medicaid HMOs	CAHPS	→	→
Beaulieu 2002	√√	Employment based insurance choices	HEDIS measures	↑	↑
Wedig & Tai-Seale 2002	√√	Employment based insurance choices	Specific consumer satisfaction measures	↑	↑
Jin & Sorensen 2006	√√	Employment based insurance choices	HEDIS measures	↑	↑
Gabel et al. 1998	√	Employment based insurance choices	HEDIS measures and NCQA accreditation	↑	↑
Hibbard et al. 1997	√	Employment based insurance choices	HEDIS, specific consumer satisfaction, hospital outcomes measures	→	→
Chernew & Scanlon 1998	√√	Employment based insurance choices	HEDIS measures	→	→
Scanlon & Chernew 1999	√√	Employment based insurance choices	HEDIS measures	→	→
Knutson et al. 1998	√√	Employment based insurance choices	Specific consumer satisfaction measures	→	→

The three studies of consumer choice made under hypothetical experimental studies are shown in Table 15 below. These studies generally demonstrated that in hypothetical situations consumers will choose high quality plans and/or be willing to trade off lower levels of coverage and lower prices if quality of care is demonstrated. In our view, although these are useful studies, they should be accorded high weight in the assessment of the evidence.

Table 15. Studies examining hypothetical impacts of publicly released quality information on plans on selection and allocative efficiency

Study	Global rating	Context	Measures system	Selection	Allocative efficiency
Spranca et al. 2000	√	Hypothetical experiment	CAHPS	↑	↑
Harris 2002	√	Hypothetical experiment	CAHPS	↑	↑
Sainfort & Booske 1996 Booske et al. 1999	√	Hypothetical experiment	HEDIS and CAHPS	↑	↑

We conclude that the evidence is uncertain in relation to the impact of the public release of quality information on selection and allocative efficiency. More recently published studies (generally related to analysis of earlier periods) provide some positive indications, but overall effects reported are modest.

Two studies indicate that an implied value of information can be estimated for consumers. The value of quality information to consumers, even where this information does not directly result in a change in choices, should be considered by policy makers in evaluating these types of initiative.

Quality improvement

Chen had identified two studies for inclusion related to the effect of reporting of quality information on health plans on quality improvement activities (Landon et al. 2008; Duvalko et al. 2009). Upon our examination of the Landon et al. (2008) study, we rejected it as it was not a study of the impact of public reporting of quality information. The paper was based on a survey of medical directors in health plans across the United States. The study found most plans measured quality, but there was no clear reference to the impact of public reporting. On examining the Duvalko et al. (2009) study, we reclassified this to organisational providers. This was a study of a range of quality improvement strategies adopted in relation to cancer care in Ontario. One of the strategies adopted was to publish performance reports for regionally based cancer services (largely hospitals).

We were unable to identify any other studies of reporting on plans that examined the impact on quality improvement.

We conclude that there is no evidence that public reporting on health plans has stimulated quality improvement activities.

Clinical outcomes

Chen included the Duvalko et al. (2009) study in his assessment of evidence and as mentioned we have reclassified this study to organisational providers.

There is some evidence from two studies that in a voluntary reporting environment health plans that have lower quality scores are likely to withdraw from reporting (Bost 2001; McCormick et al. 2002). Consequently, high quality is associated with plans that are more likely to participate in public reporting. However, our interpretation is that these studies do not indicate public reporting was a caUSI factor that resulted in higher quality scores.

We conclude that there is no evidence that public reporting on health plans has resulted in improved clinical outcomes.

Technical efficiency

We identified no studies that examined the impact of public reporting on health plans on health care costs or other measures of technical efficiency.

We conclude that there is no evidence that public reporting on health plans has resulted in improved technical efficiency or reduced costs.

Unintended consequences

The main unintended consequence identified related to the issue discussed the previous paragraph. Two studies have found that, in a voluntary reporting situation, health plans with lower quality scores tend to withdraw from public reporting initiative (Bost 2001; McCormick et al. 2002). This finding, which is consistent with common sense, has implications for public reporting initiative. Publicly available quality information should be interpreted cautiously where there is an opportunity for participants to withdraw from reporting. Ideally, public reporting systems should be clear about their scope and include all relevant entities without the opportunity to withdraw.

We conclude that there is no evidence that public reporting on health plans has resulted in overall adverse effects as a result of unintended consequences. However, there is evidence to suggest public reporting systems will be more robust when all units within its scope are included in the reporting arrangements.

5 Conclusions

This chapter presents a summary of our findings, including a summary of the evidence in relation to the specific questions set out for the review.

Summary of the evidence

Overall, the studies present a very mixed set of evidence. The Marshall, Schauffler and Fung reviews were all circumspect about the evidence, but the more recent Chen review was less so.

We agree that the evidence is strongest in relation to the impact of public reporting on organisational providers on quality improvement processes. There is some evidence of the impact of public reporting on organisational providers in relation to clinical outcomes, but this is somewhat weaker. There is some evidence that poorer quality providers will exit markets or undertake processes to improve quality as a result of public reporting.

The evidence that consumers respond to quality information is very mixed and it is our view that no clear conclusions can be drawn. One of the challenges in this area is developing an understanding of what information will be of most use to consumers in making decisions about their care. In this context, there is a tension between more global rating systems (such as hospital or health plan star rating systems) which provide very general information, and information that may be relevant to a consumer requiring a specific treatment (such as a particular surgeon's relative risk-adjusted mortality rate).

There are some clear messages from the literature on possible unintended consequences of public reporting, and systems should be designed to minimise and monitor these potential impacts. The most serious problem is that service providers will avoid more severely ill patients or patients from disadvantaged social groups. There is also evidence that the focus of quality improvement will be turned to those areas in which there is public reporting, to the neglect of other important areas where there may be opportunities for improvement. Public reporting systems should ensure a high level of participation by all groups or individuals who are the subject of reporting.

There is almost no evidence concerning the impact on public reporting on technical efficiency. The costs of public reporting (in terms of establishing and operating the reporting systems, and in terms of costs to providers and plans) have not been studied in the literature.

The evidence available in the literature is based on a small number of reporting systems with about a third of studies related to one reporting system, the NY CSRS. In addition, the majority of evidence concerning reporting of individual provider quality is related to cardiac surgery reporting systems.

To date researchers have generally not studied the comparative impact of different forms of public release, although there have been studies of how consumers comprehend information and their preferences in relation to different types of performance information.

A summary of the findings by provider type and for plans is shown in the box below.

Public reporting on individual providers

Selection/Allocative efficiency: There is some evidence that public reporting on individual providers has resulted in selection and allocative efficiency improvements. These principally relate to decisions by individual providers with relatively poor outcomes to exit the market.

Quality improvement: There is little evidence that public reporting on individual providers has stimulated quality improvement activities. Some of the evidence to date concerns the response of hospitals where there has been simultaneous release of individual and organisational provider information.

Clinical outcomes: There is limited evidence that public reporting on individual providers has resulted in improved clinical outcomes. Some of the evidence to date concerns the response of hospitals where there has been simultaneous release of information on individual and organisational providers.

Technical efficiency: There is no evidence concerning the impact of public reporting on individual providers on the costs of clinical services

Unintended consequences: There is evidence that a predictable response by providers to the public release of quality information on individual providers is their avoidance of high risk patients. This may exacerbate health care access problems for more vulnerable groups. These effects could be ameliorated by close monitoring and through better risk adjustment systems. However, this issue may also require public awareness and debate.

Public reporting on organisational providers

Selection/Allocative efficiency: There is only limited evidence that public reporting on organisational providers (hospitals or nursing homes) has resulted in selection and allocative efficiency improvements. A recent study (Pope 2009) of a well established reporting system with wide use across the United States provides some evidence that hospital ranking has a material impact on consumer choices. However more evidence is required to be confident about this conclusion.

Quality improvement: There is good evidence that public reporting on organisational providers (hospitals or nursing homes) stimulates quality improvements activities in the clinical areas which are the subject of reporting. However, it is not yet clear whether these quality improvement activities have led to improved clinical outcomes.

Clinical outcomes: There is some evidence that public reporting on organisational providers (hospitals or nursing homes) leads to improved clinical outcomes, but this conclusion requires further study. Four out of seven higher quality studies concluded there was evidence of effects on clinical outcomes.

Technical efficiency: There is no evidence concerning whether public reporting on organisational providers (hospitals or nursing homes) leads to improved technical efficiency or reduced costs.

Unintended consequences: There is evidence that public reporting on organisational providers (hospitals or nursing homes) can have unintended impacts and that these issues should be addressed by the design and monitoring of reporting systems. With public reporting, providers may avoid high risk patients and this may exacerbate health care access problems for more vulnerable groups. These impacts can be ameliorated by monitoring and better risk adjustment systems. However, this issue may also require public awareness and debate.

Public reporting on health plans

Selection/Allocative efficiency: The evidence is uncertain in relation to the impact of the public release of quality information on selection and allocative efficiency. More recently published studies (generally related to analysis of earlier periods) provide some positive indications, but overall effects reported are modest.

Two studies indicate that an implied value of information can be estimated for consumers. The value of quality information to consumers, even where this information does not directly result in a change in choices, should be considered by policy makers in evaluating these types of initiatives.

Quality improvement: There is no evidence that public reporting on health plans has stimulated quality improvement activities.

Clinical outcomes: There is no evidence that public reporting on health plans has resulted in improved clinical outcomes.

Technical efficiency: There is no evidence that public reporting on health plans has resulted in improved technical efficiency or reduced costs.

Unintended consequences: There is no evidence that public reporting on health plans has resulted in overall adverse impacts as a result of unintended consequences. However, there is evidence that suggests public reporting systems will be more robust when all units within scope are included in the reporting arrangements.

Our interpretation of the evidence is that public reporting has a much stronger impact on providers than it does on consumers. The main reason for this is that individual and organisational providers of health care are very motivated by their reputations. Public reporting leverages these motivations and can be quite powerful in creating positive, but sometime also negative, responses. In terms of public policy, if applied appropriately, the schemes could be used to have a positive impact on the effectiveness of health services.

This is not to say consumers are not interested in obtaining information on quality, nor that public policy should not pursue these schemes. The lack of evidence concerning the capacity of consumers to exert a market-like influence through selection of plans or providers requires some consideration.

Consumer interest in quality may be relatively low unless they or a close family member or friend require a service. For consumers, it may be useful to distinguish services that will be required on an on-going basis (e.g. a general practitioner, a specialist managing a chronic illness, a dialysis service or a nursing home) from those that may be required only a few times during one's life time (cardiac surgery or a hip replacement). It is also important to distinguish between services where there may be urgency in receiving care versus those where some time is available to make a decision. In the latter case, consumers and their close family members are likely to be very receptive and responsive to information about the quality of providers and also to have time to explore alternatives. In the former case, there may be fewer opportunities to explore alternatives, and consequently fewer opportunities to exert a market-like influence on providers. To date, many evaluations of public release schemes have been more focused on episodic care (such as cardiac surgery), rather than longer term care arrangements.

Specific review questions

Review question 1:

What models of publicly disclosed performance information have been demonstrated to be most effective in improving hospital performance in terms of effectiveness, efficiency and patient outcomes?

What the evidence indicates: As discussed above, no evaluations have examined the relative effectiveness of different public reporting systems. Generally the impact of one public reporting system has been compared with no public reporting, or in some cases private reporting and no reporting.

When examining evidence across studies of different types of entities on which reports are based (individual providers, organisational providers or health plans), it appears the evidence is weakest in relation to reporting on health plans and strongest in relation to reporting on organisations. However we would caution drawing conclusions about the differences between reporting on individual compared with organisational providers, because several of the systems of individual provider performance studied involved a concurrent release of organisational (hospital) information.

One potential implication of this finding for NSW and Australia is that reporting on the equivalent of health plans (e.g. geographically based Area Health Services or Local Health Networks, or states and territories), is likely to be less effective than reporting on hospital level performance.

A second dimension of reporting systems is whether reporting occurs on specific indicators for particular conditions or procedures (e.g. mortality following cardiac surgery), or whether reporting is focused on more summative measures of performance (e.g. star rating systems, consumer experience rating or overall in-hospital mortality). Unfortunately, these different types of reporting systems have not been directly studied in the literature. Most studies of individual or organisational performance have been based on reporting more specific measures. Almost all studies of individual provider reporting systems have been related to cardiac surgery mortality. Most studies of health plans have been of more summative measures, although they have sometimes been based on more detailed measures. Consequently, there is more evidence concerning the effectiveness of more specific measures.

There are several reasons why more specific measures of performance may be more effective in motivating change. These are generally much more relevant to clinicians, managers and consumers requiring a specific procedure and provide relative clear indications of the areas in which efforts should be directed to achieve change. For example, an indicator that shows a hospital is a high mortality outlier in cardiac surgery provides a clear indication that this area requires attention. An indicator that shows that a hospital is a high mortality outlier across all admissions, does not by itself provide direction of where efforts should be directed.

However, the use of more specific measures has several disadvantages. The main issue is that a large number of indicators may be required to address all areas of activity for a hospital or health services. Performance across a large number of indicators is often difficult to interpret for consumers, clinicians and managers. Specific indicators work best for surgical procedures where it is clear who the provider is and there are clear end points associated with outcomes.

Designing systems of performance measurement therefore requires judgement in finding a balance of indicators that provide reasonably clear signals about areas that need improvement, but do not overwhelm people who are attempting to interpret them. One of the important issues to consider when selecting indicators for public reporting is the extent to which the indicator represents an area for improvement that has important implications. However, it is also important

to ensure that a more general perspective is provided, to avoid conveying a sense that performance is always extremely variable across providers.

Review question 2:

Which of these models have been shown to positively influence clinician and patient behaviour? In these cases, what specific metrics have been shown to lead to positive behavioural changes among clinicians and patients? Who has collected the information and how has it been reported?

What the evidence indicates: As discussed above, no evaluations have examined the relative effectiveness of different public reporting systems. In examining evidence across studies of different types of entities on which reports are based (individual providers, organisational providers or health plans), the evidence appears weakest in relation to reporting on health plans and strongest in relation to reporting on organisations.

In terms of specific metrics, it is difficult to draw strong conclusions. There is more evidence concerning the effectiveness of specific measures of performance such as risk-adjusted mortality following CABG, than summative measures such as star rating systems. In the discussion above we offer some reasons why specific metrics might have greater impacts, but decisions on systems of performance information generally require a balance of specific and summative measures.

Information collection arrangements vary significantly across different public reporting systems. These range from:

- Specific data collections for a particular procedure (e.g. CABG) with patient level information and allowing for appropriate risk adjustment of measures (e.g. NYS CSRS). These systems generally collect data directly from physicians (or their staff). Although, the collation and analysis of information is often undertaken by a specialist unit within government or a government-sponsored agency.
- Use of more routinely reported hospital morbidity and mortality data. Data is extracted from these collections and then analysed by a specialist unit either in government or a government-sponsored agency.
- General data collection systems set up to populate indicator sets (e.g. HEDIS). In the case of HEDIS, data is collected by health plans (often through service providers) and then forwarded to NCQA, a private not-for-profit organisation which collaborates with private plans and governments. NCQA analyses the data and forwards it back to health plan organisations and to other reporting agencies.

Review question 3:

What methods of reporting performance information have been shown to be most effective in influencing physician and patient behaviour? For example, what evidence exists regarding the effectiveness of different communication vehicles such as printed media or websites?

What the evidence indicates: Studies included in this review include systems that were set up prior to the wide spread adoption of the internet. Many of the reporting systems studied in the 1990s involved paper reports that were made available to interested parties or forwarded to all relevant consumers/providers. In some instances these reports were replicated in newspapers. Many of these systems have generally evolved to arrangements in which the report is made available as a document on the internet (e.g. NYS CSRS).

Systems developed in the 2000's have tended to involve searchable websites.

In Appendices 6 and 8 we provide details of some of these systems. Appendix 7 provides a sample of key report pages or screens.

There is no clear evidence over the relative effectiveness of these alternative information delivery strategies. There have been a number of studies of consumer comprehension of alternative measures of presenting performance information, but these have not been systematically reviewed.

There appears to be a case for a combination of approaches to delivering information. Searchable web-based systems, if well designed, have the potential to allow consumers and clinicians ready access to all relevant information about a specific hospital. However, comparative information is more likely to be better conveyed through specific reports, available in paper and forms, where tables and charts can be explained and commented on.

A number of systems gained high prominence as a result of a high level of media (principally press) coverage. If a public policy goal is to engage the community in a debate about health care quality, then there is a case for developing a strategy that allows release of relevant information through the media.

Finally, there is a case for allowing access to data sets of indicators (or relevant underlying data), to stimulate health service research on the indicators, leading to a better understanding of the indicators and how they may be improved.

Review question 5:

How have hospital performance measures been adjusted to account for important differences, such as size or complexity of cases, to allow fairer comparisons within and between hospitals?

What the evidence indicates: Most systems of public reporting involve the application of risk adjustment approaches to the measures reported. Risk adjustment involves identifying patient characteristics (e.g. age or pre-existing medical conditions) that have a material effect on the outcome measured, and adjusting the measures by standardising for these factors. Good risk adjustment systems remove the effect of the different patient population treated by different hospitals or physicians and allow for comparisons to be narrowed to the performance of the hospital or physician. However, no system of risk adjustment is perfect and there are often significant debates about which factors are relevant and which are not.

Due to the inherent variation in outcomes in any health service, the number of cases treated by a hospital or physician is a factor that must be considered when reporting results. These issues can be handled in a number of ways, including:

- They may be ignored (i.e. where variation is unlikely to have a material impact on comparison. Most comparisons of performance at the state and territory level in Australia ignore this issue)
- Units may be assigned to a number of classes based on performance (e.g. star rating systems, although this ignores the uncertainty over whether a particular unit belongs in a particular class)
- Confidence intervals may be presented (e.g. the NYS CSRS report, as shown in Appendix 7)
- Only units identified as outliers are identified (e.g. the Queensland VLAD system).

There is no one way of addressing these issues. There are trade-offs between fairly and accurately presenting performance data and allowing users to interpret data.

Review question 6:

What performance information has been shown to be less helpful, open to misuse or resulted in unintended negative consequences?

What the evidence indicates: From the studies examined there is no one set of information that is less helpful. Generally, the literature has concluded that overall consumer satisfaction ratings do not vary greatly and are not helpful in identifying areas for improvement. It is more important to develop consumer assessment methods that allow consumers to rate aspects of their actual experience.

There are a number of potential unintended negative consequences that have been identified in the literature. These include:

- *Cream skimming:* Physicians and hospitals may avoid more severely ill patients or patients from disadvantaged social groups, as these are likely to have poorer outcomes. Remedies to this issue include (a) improved risk adjustment systems and (b) ensuring these issues are monitored in any system of public reporting
- *The lamp post effect:* Focusing on publicly reported performance may lead to the neglect of other, sometimes more important issues. Remedies to this issue include (a) ensuring public reporting is focused on issues that are important and where there is an opportunity for significant improvement; (b) supplementing publicly reported indicators with monitoring of a broader range of performance information to identify areas where performance might be deteriorating.

Review question 4:

What lessons have been learnt about how to optimise the effectiveness of publicly disclosed information to compare hospital performance and motivate improvement?

and

Review question 7:

What new models of publicly disclosed performance information exist, that may not yet have demonstrated their effectiveness, but appear to represent promising practices?

What the evidence indicates: Appendix 8 lists a range of public release reporting systems which are accessible through the internet. There has been a significant expansion of public reporting across the world. However, it is difficult to judge exactly how promising these initiatives are. Nevertheless, there are some attributes of systems that we believe are worthwhile highlighting that appear to be related to the strength of systems:

- Many systems are government initiatives and are managed within government agencies. However, some initiatives which have been particularly successful and have a high level of recognition were developed outside the public sector, for example Dr Foster in the United Kingdom (www.drfooster.co.uk) and the US News and World Report Hospital Rankings (health.usnews.com/sections/health). The relative independence of these initiatives has had some advantages in that it was possible to implement them quickly, despite strong resistance within the health system. Dr Foster has now evolved to be more of a public private partnership. Therefore, we would conclude that some level of independence from government or at least health agencies is useful in progressing an initiative relatively quickly
- Studies provide mixed evidence on whether public reporting is more effective in promoting quality improvement and outcomes, compared with feedback and/or a system of quality improvement. Our view is that the best approach would combine public reporting with a system of quality improvement focused around those indicators.

The VLAD system implemented in Queensland provides one example of how this might be achieved. In NSW, a challenge will be how to coordinate the efforts of the agency responsible for public reporting (i.e. the Bureau of Health Information) with agencies responsible for quality improvement initiatives (i.e. the Clinical Excellence Commission and the Agency for Clinical Innovation). Ideally, a system would be established where hospitals have an opportunity or obligation to investigate the reasons that they have been identified as an outlier in relation to an indicator and to identify what action they have taken to address the issue prior to public release of the information

- There are many demands for improved quality and performance information, and these generally result in service providers (hospitals and clinicians) collecting more data. There are thousands of indicators that are being reported through various mechanisms by Australian hospitals and clinicians. Whilst many of these are derived from 'routinely' collected data, there are significant (and often hidden) costs in implementing reporting systems. It is a genuine challenge to minimise duplication of these efforts and minimise costs. A national partnership approach across the public and private sectors would be useful to set priorities for indicator development and the implementation of systems to support the collection of relevant data.

Appendix 1: Search strategy

Adapted from Fung et al. 2008

PubMed, 1 January 2009–25 October 2010

Other limiters: English, human

Search 1 – Not conducted

Title search on Marshall et al. (27)

Search 2 – Not conducted

“Related articles” search on Marshall et al. (27)

Items retrieved:

Search 3 – Not conducted

“Related articles” search on Schneider and Lieberman (29)

Items retrieved:

Search 4A

information dissemination OR information services OR disclos* OR data shar* OR report card* OR profil* OR disseminat*[tiab]

AND

public opinion OR attitude of health personnel OR consumer participation OR benchmark* OR consumer*[tiab] OR public[tiab]

AND

quality of health care[mj] OR hospitals/standards[mh:noexp] OR physicians/standards[mh:noexp] OR performance[tiab]

Items retrieved: 661

Search 4B: The following terms were added to search 4A:

public opinion OR attitude of health personnel OR consumer participation OR benchmark* OR consumer*[tiab] OR public[tiab]

AND

quality of health care[mj] OR hospitals/standards[mh:noexp] OR physicians/standards[mh:noexp] OR performance[tiab]

AND

transparen* OR scorecard* OR score card*

NOT

Results of search 4A

Items retrieved: 64

Appendix 2: Excluded studies

Papers included in the Marshall, Schauffler or Chen reviews but not included in the current review

Individual Providers

Review	Paper	Reason for exclusion
Marshall	Hibbard & Weeks 1989	Whilst the study examined the effect of publishing cost information on consumer choice, it did not examine the impact of publicly released quality information
Schauffler	Sorokin 2000	Study did not evaluate impact of report cards. It was concerned with technical issues that lead to inaccuracies in measures used in report cards for individual physicians

Organisational Providers

Review	Paper	Reason for exclusion
Marshall	Romano et al. 1999	Study was about perceptions of report cards (e.g. whether state-based reports are perceived as more favourable than nationally developed reports) rather than efficiency, effectiveness or quality improvement resulting from public release of data
Marshall	US General Accounting Office 1994	A situation analysis with respect to public reporting and outstanding issues, not a study
Marshall, Schauffler	Jewett & Hibbard 1996	Study was about consumers' comprehension of quality indicators appearing in health care report cards rather than their response to a specific public reporting initiative, specifically how their choices would change
Schauffler	Wakefield et al. 1996	Doesn't evaluate impact of publicly released performance information. The study examined indicators on nosocomial infections. It concluded that differences in data collection processes may result in incorrect conclusions about differences in the quality of care provided by various providers
Chen	Sullivan et al. 2006	This was not a study of the impact of public reporting. The hospital involved conducted a quality improvement process and subsequently published results of the process on its website
Chen	Stewart 2006	This study evaluated the impact of provided quality reports to participating hospitals, but these reports were not publicly released
Chen	Jha et al. 2009	This was a study of the nature of indicators used in a public reporting system, but it did not evaluate the impact of the public release of these indicators
Chen	Levy et al. 2007	The study did not involve public release of data. Patient rating were reported on an intranet site to participating infirmaries
Chen	Mazor & Dodd 2009; Mazor et al. 2009	This was a study of consumers' understanding of performance reports. Consumers were asked whether performance information would influence choices, but not in an experimental situation
Chen	Kritchevsky et al. 2008	Study involved a comparative feedback report to hospitals which was not publicly released
Chen	Peters et al. 2007	Study was about consumers' comprehension of quality indicators appearing in health care report cards rather than their response to a specific public reporting initiative, specifically how their choices would change

Health Plans

Review	Paper	Reason for exclusion
Marshall	Hibbard et al. 1998	Not a study of public release of information. Focuses on how well informed Medicare beneficiaries are about their choices of health plan
Marshall	US General Accounting Office 1994	More of a situation analysis with respect to public reporting and outstanding issues
Schauffler	Scanlon 1998	Did not evaluate impacts of publicly released performance information. Study compared the actual report cards from seven different systems. The study found discrepancies in rating systems, which may reflect methodological issues pertaining to the sample of health plans used, plan performance measures included, and the processes by which individual measures were aggregated to construct indices and ratings. The authors conclude, health plan report cards may be sending mixed signals to consumers
Schauffler	Maxwell 1998; Maxwell et al. 1998	Not specifically related to publicly released data
Schauffler	Hibbard & Jewett 1996	Study of what consumers want in quality reports, rather than a response to actual or hypothetical quality information
Schauffler	Hibbard & Jewett 1997	Study of what consumers want in quality reports, rather than a response to actual or hypothetical quality information
Schauffler	Tumlinson et al. 1997	Study of what consumers want in quality reports, rather than a response to actual or hypothetical quality information
Schauffler	Gibbs et al. 1996	Study of what consumers want in quality reports, rather than a response to actual or hypothetical quality information
Schauffler	Isaacs 1996	Study of what consumers want in quality reports, rather than a response to actual or hypothetical quality information
Schauffler	Schauffler & Rodriguez 1996	Doesn't evaluate impact of publicly released performance information. Reports on results of consumer focus groups, but not on decision making/plan choice
Schauffler	Wakefield et al. 1996	Doesn't evaluate impact of publicly released performance information related to nosocomial infections. The study concluded that differences in data collection processes may result in incorrect conclusions about differences in the quality of care provided by various providers
Marshall	Robinson & Brodie 1997	Doesn't evaluate impact of publicly released performance information.
Schauffler	Stange et al. 1998	Doesn't evaluate impact of publicly released performance information.
Schauffler	Schauffler et al. 1999	Not a study of the impact of publicly released performance information
Chen	Landon et al. 2008	Not a study of public reporting
Chen	Uhrig et al. 2006	A study of consumer comprehension

Appendix 3A: Individual provider studies – quality assessment

Review	Reporting initiative	Study	Objective	Domain 1:			Domain 2:		Global rating
				Subject of reporting	Participants	Rating	Type	Rating	
New Study	Pennsylvania Health Care Cost Containment Council (PHC4)	Epstein 2010	To quantify the extent to which referral patterns to cardiac surgeons changed in response to the publication of a CABG report card	Cardiac surgeons performing CABG in Pennsylvania and Florida	Patients undergoing CABG surgery in Pennsylvania and Florida prior to and post the May 2002 Pennsylvania report card	***	Observational cohort with controls	***	√√√
New Study	California CABG Outcomes Public Reporting Program (CCORP)	Li et al. 2010	To assess the impact of CABG Outcomes Reporting Program in California	Cardiac surgeons in acute hospitals performing CABG operations in California	All isolated CABG cases from the California CABG Outcomes Reporting Program database between 2003 and 2006	***	Observational cohort	**	√√
Chen, previously under Organ- isational providers	UK Adult Cardiac Surgery Audit	Khan et al. 2007	To analyse the effect of the introduction of surgeon-specific data (SSD) on surgical training in a large cardiac surgical centre	Cardiac surgeons performing CABG in the UK	2111 consecutive patients undergoing elective coronary artery bypass surgery, aortic and mitral valve surgery at Southampton General Hospital between April 2000 and April 2004 in the UK	***	Observational cohort	**	√√
Fung, Chen	NYS CSRS	Burack et al. 1999	To examine the effects on the practice of cardiac surgery, as perceived by surgeons	Cardiac surgeons in New York State performing CABG	104 New York cardiac surgeons (69% response rate) –1997	***	Cross sectional descriptive survey	*	√
Fung, Chen	NYS CSRS	Hannan et al. 1995	To examine the longitudinal relationship between surgeon volume and in-hospital mortality for CABG surgery in New York and explain changes in mortality over time	Cardiac surgeons in New York State performing at least 200 isolated CABG operations	57 187 patients undergoing isolated CABG surgery in New York (1989–1992)	***	Observational cohort	**	√√

Individual provider studies – quality assessment

Review	Reporting initiative	Study	Objective	Domain 1:			Domain 2:		Global rating
				Subject of reporting	Participants	Rating	Type	Rating	
Fung, Chen	NYS CSRS	Jha & Epstein 2006	To examine the relationship between providers' NYS CSRS rankings and market share; to examine impact of cardiac surgeons' performance on the likelihood of ceasing practice in New York	Cardiac surgeons in New York State performing CABG	All New York cardiac surgeons who dropped out of the reporting system (1989–1999)	***	Observational cohort	**	√√
Fung, Chen	NYS CSRS	Mukamel et al. 2004	To examine the impact of the NYS CSRS on selection of cardiac surgeons	Cardiac surgeons in New York State performing CABG	All New York Medicare fee-for-service enrollees 65 years of age who underwent CABG (1991–1992)	***	Observational cohort	**	√√
Fung, Chen	New York PCI Reporting System	Narins et al. 2005	To assess the influence of the New York PCI report on physicians being monitored	Physicians in New York state performing PCI	Interventional cardiologists included in the New York State PCI report (65% response rate) (2003)	***	Cross sectional descriptive survey	*	√
Fung, Chen	NYS CSRS	Werner et al. 2005	To investigate the impact of the NYS CSRS on racial and ethnic disparities in use of CABG, PTCA, and cardiac catheterisation	Cardiac surgeons in New York State performing CABG	Hospital discharges from the New York State Department of Health's inpatient data files and hospital discharges in a group of comparison states in the Nationwide Inpatient Sample from the HCUP-3 (928 551 patients with AMI) (1988–1995)	***	Observational cohort with controls	***	√√√
Schauffler, Fung, Chen	NYS CSRS	Mukamel et al. 2000 Mukamel et al. 2002	To use telephone interviews and contracting data from the majority of managed care organisations (MCOs) licensed in New York to determine whether New York MCOs consider quality when they choose cardiac surgeons and whether NYS CSRS affects contracting patterns	Cardiac surgeons in New York State performing CABG	Decision makers within MCOs who are responsible for the selection of providers in New York (59% response rate) (1998)	***	Observational cohort; Cross-sectional study	**	√√

Review	Reporting initiative	Study	Objective	Domain 1:			Domain 2:		Global rating
				Subject of reporting	Participants	Rating	Type	Rating	
Marshall, Schauffler, Fung, Chen	Pennsylvania Health Care Cost Containment Council (PHC4)	Schneider & Epstein 1996	To assess the influence of the Pennsylvania Consumer Guide to CABG Surgery on cardiologists and cardiac surgeons	Cardiac surgeons performing CABG in Pennsylvania	Randomly selected cardiologists and cardiac surgeons practicing in Pennsylvania (65% overall response rate) (1995)	***	Cross sectional descriptive survey	*	√
Marshall, Schauffler, Fung, Chen	NYS CSRS	Mukamel & Mushlin 1998	To measure the relationship between provider ratings in the NYS CSRS and rates of growth in fee-for-service market share	Cardiac surgeons in New York State performing at least 200 isolated CABG operations	New York cardiac surgeons with a Unique Physician Identification Number (1990–1993)	***	Observational cohort	**	√
Marshall, Schauffler	Pennsylvania Health Care Cost Containment Council (PHC4)	Schneider & Epstein 1998	To examine the awareness and use of statewide consumer guide that provides risk-adjusted, in-hospital mortality ratings of hospitals that provide cardiac surgery	Cardiac surgeons performing CABG in Pennsylvania	A total of 474 (70%) of 673 eligible patients who had undergone CABG surgery during the previous year at 1 of 4 hospitals listed in the Consumer Guide as having average mortality rates between 1% and 5% were successfully contacted	***	Cross sectional descriptive survey	*	√
Marshall, Schauffler	NYS CSRS	Hannan et al. 1997	To assess the extent to which referring cardiologists share risk-adjusted mortality outcomes data with patients and use the data to make referrals	Cardiac surgeons in New York State performing CABG	Four hundred and fifty cardiologists responded to the survey (36% response rate)	***	Cross sectional descriptive survey	*	√

Appendix 3B: Individual provider studies – results

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Epstein 2010	√√√	Selection, Allocative efficiency: No significant change in referral patterns to either low-mortality or high-mortality cardiac surgeons. Referring physicians on average appear to have been knowledgeable about the relative performance of cardiac surgeons without report cards	↔			↔		
Li et al. 2010	√√	Selection, Allocative efficiency: Total CABG volume decreased from 2003 to 2006 by almost 27% but patient casemix for most hospitals and surgeons was unchanged Clinical outcomes: Despite similar patient characteristics, the operative mortality for patients in the highest risk group was 26% lower in 2006 than in 2003. However, there was no control in the study with which to compare this trend. Among surgeons with higher risk-adjusted mortality rates, there was a trend toward a lower operative mortality, although the majority of surgeons who performed CABG in both 2003 and 2006 had reductions in their risk-adjusted mortality rates Unintended consequences: No evidence of decreased access to CABG for high risk patients in California during the period of public reporting of isolated CABG outcomes	↔		↔			↔
Khan et al. 2007	√√	Clinical outcomes, Unintended consequences: SSD was associated with a reduction in the overall proportion of cases performed by trainees (49% versus 42.8%; P = 0.004) and, in particular, a reduction in the proportion of aortic and mitral valve procedures performed by trainees. In addition, the proportion of cases performed by the trainees without consultant supervision declined significantly following SSD (18.7% versus 10.4%)			↑			↑
Burack et al. 1999	√	Allocative efficiency, Unintended consequences: 62% of cardiac surgeons refused to operate on ≥1 high risk CABG patient over the preceding year, primarily because of public reporting.				↑		↓
Hannan et al. 1995	√√	Selection, Allocative efficiency: Percentage of patients undergoing CABG surgery by low-volume surgeons decreased from 7.6% in 1989 to 5.7% in 1992 Clinical outcomes, Allocative efficiency: Proportionately larger decrease in risk-adjusted mortality rate (RAMR) for low-volume surgeons was not due to changes in patient casemix; the decrease was due in part to an exit of high RAMR surgeons from clinical practice and an influx of low RAMR surgeons	↑		↑	↑		--
Jha & Epstein 2006	√√	Selection, Allocative efficiency: Poor performance was associated with increased odds of ceasing practice	↑			↑		

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Mukamel et al. 2004	√√	Selection, Allocative efficiency: For the average patient, the NYS CSRS influenced selection of cardiac surgeon and diminished the importance of surgeon experience and price as signals for quality Unintended consequences: In the post-report period, patients from more affluent and more educated neighbourhoods were more likely to be treated by low RAMR surgeons, and patients from lower socioeconomic neighbourhoods were more likely to be treated by high RAMR surgeons	↑			↑		↓
Narins et al. 2005	√	Allocative efficiency, Unintended consequences: 79% of interventional cardiologists agreed or strongly agreed that public reporting has influenced their decision on whether to perform angioplasty on individual patients and critically ill patients with high expected mortality rates				↑		↓
Werner et al. 2005	√√√	Unintended consequences: Racial and ethnic disparity in CABG use increased in New York immediately after implementation of the NYS CSRS, whereas disparities did not change in the comparison states; these disparities decreased to levels similar to report card pre-release levels over time; no differences in percutaneous transluminal coronary angioplasty(PTCA) or cardiac catheterisation after the CABG report card was released						↓
Mukamel et al. 2000; Mukamel et al. 2002	√√	Selection, Allocative efficiency: 20% indicated that the NYS CSRS reports were a major factor in their contracting decision; actual contracting patterns show that MCOs contract on the basis of a surgeon's designation as a high quality outlier, but they do not make choices on the basis of poor-quality outlier designation or actual RAMR	↑			↑		
Schneider & Epstein 1996	√	Unintended consequences: 59% of cardiologists reported increased difficulty finding surgeons willing to perform CABG in severely ill patients who required it; 63% of cardiac surgeons reported being less willing to operate on such patients						↓
Mukamel & Mushlin 1998	√	Technical efficiency: Physicians with better outcomes had higher rates of growth of charges					↓	
Schneider & Epstein 1998	√	Selection, Allocative efficiency: Ninety-three (20%) of patients were aware of the Consumer Guide but only 56 (12%) knew about it before surgery. Among the 56 patients, 18 reported knowing the hospital rating and 7 reported knowing the surgeon rating, 11 said hospital and/or surgeon ratings had a moderate or major impact on their decision making, but only 4 were able to specify either or both correctly. When the Consumer Guide was described, 273 (58%) reported that they probably or definitely would change surgeons if they learned that their surgeon had a higher than expected mortality rate in the previous year	↔			↔		

Individual provider studies – results

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Hannan et al. 1997	√	Selection, Allocative efficiency: A majority of cardiologists (68%) has not generally changed their well established referral patterns as a result of the New York CABG surgeons' reports	↔					

Appendix 4A: Organisational provider studies – quality assessment

Review	Initiative	First author, year	Objective	Domain 1:			Domain 2:		Global rating
				Subject of Reporting	Participants	Rating	Type	Rating	
New Study	NYS CSRS	Dranove & Sfekas 2008	To assess the effectiveness of the “news” that report cards provide to the market	New York hospitals	All New York area patients who underwent CABG surgery in 18 hospitals in the New York metropolitan area between 1989 and 1991	***	Observational cohort	**	√√
New Study	Nursing Home Compare	Castle 2009a, b	To examine whether consumers were using the Nursing Home Compare, and whether they could accurately interpret the quality information given in the report	Nursing Homes in the US	8,000 family members with elders living in one of 200 randomly selected nursing homes	***	Cross-sectional study (survey)	*	√
New Study	Nursing Home Compare	Mukamel et al. 2007	To examine the initial reactions of nursing homes to publication of the Nursing Home Compare report card and to evaluate the impact of the report card on quality improvement activities	Nursing Homes in the US	Random sample of 1,502 nursing homes, of which 724 responded	***	Cross-sectional study (survey)	*	√
New Study	Nursing Home Compare	Stevenson 2006	To evaluate whether quality information reported on Nursing Home Compare had any impact on nursing home occupancy following its release	Nursing Homes in the US	Medicaid- and Medicare-certified nursing home providers, reporting to the Online Survey, Certification, and Reporting (OSCAR) system between 1996 and 2002	***	Observational cohort	**	√√
Previously included under health plans by Chen	Ontario Cancer Care	Duvalko et al. 2009	To describe the structure and examine the impact of Cancer Care Ontario's Clinical Governance Framework. The framework aims to 1) develop system-level quality indicators; 2) use data for developing clinical guidelines; 3) transfer knowledge through a coordinated program and clinical engagement, and 4) use contractual agreements, financial incentives and public reporting	Hospitals and health care providers involving cancer care in Ontario	Population based databases	***	Observational cohort	**	√

Review	Initiative	First author, year	Objective	Domain 1:			Domain 2:		Global rating
				Subject of Reporting	Participants	Rating	Type	Rating	
Chen	US Assisted Reproductive Therapies (ART) Clinics	Bundorf et al. 2009	To evaluate the impact of public reporting on consumer choices in the context of providing ART	Clinics that were the members of the Society for Assisted Reproductive Technology (SART) and the subjects of mandatory public reporting since 1998 through CDC, the US	All clinics that submitted their data to SART between 1995 and 2003. In 2003, 440 clinics were included	****	Observational cohort	**	√√
Chen	Hospital Quality Incentive Demonstration (HQID)	Drake et al. 2007	To examine where increased success in meeting the HQID pneumonia antibiotic timing measure is tied to an increase in antibiotic use for conditions where antibiotics are unwarranted	Hospitals in the US participating HQID	130 top HQID performing hospitals for the pneumonia antibiotic timing	***	Observational cohort	**	√√
Chen	Hospital Quality Alliance (HQA)	Friedberg et al. 2009	To determine whether publicly reporting hospital scores on antibiotic timing in pneumonia (percentage of patients with pneumonia receiving antibiotics within 4 hours) has led to unintended adverse consequences for patients	Hospitals participating in HQA	Retrospective analyses of 13,042 emergency department (ED) visits by adult patients with respiratory symptoms in the National Hospital Ambulatory Medical Care Survey, 2001–2005	****	Observational cohort	**	√√
Chen	Ontario, CABG	Guru et al. 2006	To evaluate the differences in patient characteristics and outcomes observed during the transition from no reporting to confidential, and ultimately public performance report cards for CABG surgery in a public health system	Hospitals in Ontario	CABG surgery in Ontario for 67693 patients from September 1, 1991, to March 31, 2002	****	Observational cohort with controls	***	√√√
Chen	PHC4	Hollenbeak et al. 2008	To identify associations between intensive public reporting and in-hospital mortality in 6 conditions AMI, CHF, hemorrhagic stroke, ischemic stroke, pneumonia and sepsis	Hospitals in Pennsylvania	Propensity score matching produced 168 104 matched patient pairs for analysis	***	Observational cohort with controls	***	√√√

Review	Initiative	First author, year	Objective	Domain 1:			Domain 2:		Global rating
				Subject of Reporting	Participants	Rating	Type	Rating	
Chen	CCORP	Li et al. 2010	To assess the impact of CABG Outcomes Reporting Program in California	Hospitals providing CABG operations in California	All isolated CABG cases from the California CABG Outcomes Reporting Program database between 2003 and 2006	****	Observational cohort	**	√√
Chen	Hospital Quality Alliance (HQA)	Lindenauer et al. 2007	To evaluate the individual and comparative PR and P4P	Hospitals participating in Centers for Medicare and Medicaid Services (CMS) Premier Hospital Quality Incentive Demonstration (HQID) program (P4P: HQA: PR)	406 HQID hospitals (P4P+PR) and 207 HQA (PR only) hospitals over 2 year period	***	Observational cohort with controls	***	√√√
Chen	France Infection Control Activity	Merle et al. 2009	To assess the impact of French government mandatory infection control activity (ICALIN) report card on patients' attitude towards hospital choice	Hospitals in France	29 hospitals from Upper Normandy (north-western France) areas with a total of 381 patient participants.	**	Cross-sectional study (survey)	*	√
Chen	Nursing Home Compare	Mukamel et al. 2008	To examine associations between nursing homes' quality and publication of the Nursing Home Compare quality report card by CMS	Nursing homes in the US	701 random sample nursing homes; the Minimum Data Set (MDS) with information about all residents in these facilities and the Nursing Home Compare published quality measure (QM) scores	***	Observational cohort	**	√√
Chen	Nursing Home Compare	Mukamel et al. 2009	To test empirically the hypothesis that nursing homes have responded to the publication of the report by adopting cream skimming admission policies	Nursing homes in the US	All Medicare/Medicaid certified nursing homes nationally, focusing on Medicare eligible residents admitted for long-term rather than post- acute care, aged over 65 years, 2001–2005	***	Observational cohort	**	√√

Review	Initiative	First author, year	Objective	Domain 1:			Domain 2:		Global rating
				Subject of Reporting	Participants	Rating	Type	Rating	
Chen	US News and World Report Hospital Rankings	Pope 2009	To estimate impact of hospital rankings on changes of both patient volume and hospital revenues	Hospitals in the US ranked by US News and World Report	All hospitalised Medicare patients in California (1998–2004) and a sample of other hospitals around the country (1994–2002)	***	Observational cohort	**	√√
Chen	Georgia Partnership for Health and Accountability (PHA)	Rask et al. 2006	To describe the PHA, a voluntary quality improvement and patient safety program focused on comprehensive evaluation and feedback in Georgia, the US. PHA publishes an annual state-wide hospital- specific report, Insights available to the public. This report tracks individual hospital participation in voluntary clinical improvement initiatives	Hospital participating in the PHA	Descriptive analysis with two case selective sample hospitals	**	Descriptive analysis with two case studies	*	√
Chen	Ontario, EFFECT Study	Tu & Lauer 2009	To evaluate whether the public release of data on cardiac quality indicators effectively stimulates hospitals to undertake quality improvement activities that improve health care processes and patient outcomes on composite and individual 12 AMI and 6 CHF process-of-care indicators	All acute Ontario hospitals.	86 Acute Ontario hospital corporations	***	Cluster randomised control trial (RCT) (early feedback group versus late feedback group)	****	√√√
Chen	Nursing Home Compare	Werner, Konetzka & Kruse 2009 Werner, Konetzka, Stuart et al. 2009 Werner et al. 2010	To evaluate whether public reporting in the setting of nursing homes resulted in improvement of reported and broader but unreported quality of post-acute care	Nursing homes in the US	A total of 8,137 skilled nursing home facilities (SNFs) were included in the study. Analysis was based on the 1999–2005 nursing home MDS and inpatient Medicare claims. These provided services for 9,390,930 post- acute care stays and 5,899,327 post-acute care stays of at least 14 days	***	Observational cohort with controls for some components of study	***	√√√

Review	Initiative	First author, year	Objective	Domain 1:			Domain 2:		Global rating
				Subject of Reporting	Participants	Rating	Type	Rating	
Chen	Nursing Home Compare	Zinn et al. 2008	To assess whether differences in strategic orientation of nursing homes as identified by the Miles and Snow typology are associated with differences in their response to the publication of quality measures on the Nursing Home Compare website	Nursing homes in the US	10 % random sample (1502 nursing homes) with a response rate of 48.2%	***	Descriptive survey	*	√
Fung, Chen	Greater Cleveland Health Quality Choice (GCHQC)	Baker et al. 2002 Baker et al. 2003	(1) To examine mortality trends associated with the CHQC program (Baker et al. 2002) and (2) to examine market share after release of risk-adjusted 30 day mortality rates for 6 acute conditions as part of the CHQC program (Baker et al. 2003)	Hospitals in Cleveland Ohio	Medicare patients hospitalised in 30 non-federal hospitals in Cleveland with AMI, heart failure, gastrointestinal hemorrhage, obstructive pulmonary disease, pneumonia, or stroke (1991-1997); Market share analysis based on the 30 hospitals	***	Observational cohort	**	√√
Fung, Chen	NYS CSRS	Chassin 2002	To examine the relationship between mortality rate outlier status and hospital CABG volume and quality improvement activity after NYS CSRS implementation	Hospitals in New York state performing CABG	New York hospitals with the highest and lowest CABG mortality (1989-1995) + key informants at 4 hospitals and state officials directly involved in quality improvement efforts at the hospitals (interviewed in 2001)	****	Observational cohort	**	√√
Fung, Chen	GCHQC	Clough et al. 2002	To measure changes in in-hospital mortality rates associated with the implementation of the CHQC reporting initiative	Hospitals in Cleveland Ohio	Hospitals included in the Ohio Hospital Association's inpatient discharge data (1992-1995)	***	Observational cohort with controls	***	√√
Fung, Chen	NYS CSRS PHC4	Dranove et al. 2003	To study the effects of public reporting in New York and Pennsylvania	Hospitals in New York States and Pennsylvania performing CABG	Medicare beneficiaries and hospitals found in a Medicare claims data set (not specified) and hospitals participating in the American Hospital Association annual survey (1987-1994)	****	Observational cohort with controls	***	√√√

Review	Initiative	First author, year	Objective	Domain 1:			Domain 2:		Global rating
				Subject of Reporting	Participants	Rating	Type	Rating	
Fung, Chen	NYS CSRS	Ghall et al. 1997	To compare trends in CABG-related mortality in Massachusetts (which lacks state-wide public reporting of CABG outcomes) with those in New York (which has public reporting) and northern New England	Hospitals in New York state performing CABG	12 Massachusetts hospitals performing cardiac surgery (except Veterans Affairs hospitals) and hospitals contained in the HCFA hospital 30 day unadjusted mortality data set (1990, 1992, and 1994)	****	Observational cohort with controls	***	√√√
Fung, Chen	Quality Counts	Hibbard et al. 2003, 2005	To compare the effects of public (Quality Counts), confidential, and no reporting on quality improvement activity, market share, and risk-adjusted performance (two summary indices of adverse events and indices in three clinical areas – hip/knee surgery, cardiac care, and obstetric care	Hospitals (sample of 24) in south-central Wisconsin	24 hospitals participating in Quality Counts (public release) 37 general hospitals receiving private reports (not publicly released), 41 receiving no reports (total 115 hospitals) in Wisconsin	***	Observational cohort with controls	***	√√√
Fung, Chen	NYS CSRS	Jha & Epstein 2006	To examine the relationship between providers' NYS CSRS rankings and market share; to examine impact of cardiac surgeons' performance on the likelihood of ceasing practice in New York	Hospitals in New York state performing CABG	All New York hospitals performing CABG for more than three years (1989–2002)	****	Observational cohort	**	√√
Fung, Chen	NHS Star Rating	Mannion et al. 2005	To describe impact of the NHS star performance ratings on quality improvement efforts	Hospital trusts in England	Staff at four low- performing hospital trusts and two high performing hospital trusts	**	Case series	*	√
Fung, Chen	New York PCI Reporting System	Moscucci et al. 2005	To measure the effect of the New York State PCI report on case selection for PCI by comparing Michigan's and New York's adjusted and unadjusted in-hospital mortality rates	Hospitals in New York state performing CABG	11 374 patients in a multicenter Michigan PCI database and 69 048 patients in a state-wide New York PCI database (1998–1999)	****	Observational cohort	**	√√
Fung, Chen	NYS CSRS	Omoigui et al. 1996	To determine whether dissemination of NYS CSRS mortality data was associated with outmigration of high risk patients to undergo treatment at the Cleveland Clinic	Hospitals in New York state performing CABG	9442 patients receiving CABG at the Cleveland Clinic (1989–1993)	****	Observational cohort	**	√√

Review	Initiative	First author, year	Objective	Domain 1:			Domain 2:		Global rating
				Subject of Reporting	Participants	Rating	Type	Rating	
Fung, Chen	NYS CSRS, California Hospital Outcomes Project (CHOP)	Romano & Hong 2004	To examine the relationship between outlier status in California and New York public reports for three conditions or procedures (CABG mortality in New York; AMI and post diskectomy complications in California) and hospital volume	Hospitals in New York state performing CABG; all non-federal	All licensed, non- federal hospitals in New York performing CABG, and non-federal hospitals in California except Kaiser hospitals and state developmental and correctional hospitals	****	Observational cohort	**	√√
Fung, Chen	Ontario ICES Atlas	Tu & Cameron 2003	To study the impact of the Cardiovascular Health and Services in Ontario: An ICES Atlas, which reports hospital-specific AMI performance measures, on quality improvement activity	Hospitals in Ontario providing AMI care	Physicians working in Ontario hospitals representing 62 of 121 eligible hospitals (52% overall hospital response rate) –2000	**	Descriptive (survey)	*	√
Marshall, Fung, Chen	NYS CSRS	Dziuban Jr et al. 1994	To document a hospital's response to being identified as a high risk-adjusted mortality outlier in the NYS CSRS	Hospitals in New York state performing CABG	One poor- performing New York hospital (1992–1993)	**	Case study	*	√
Marshall, Fung, Chen	NYS CSRS	Hannan, Kilburn Jr et al. 1994 Hannan, Kumar et al. 1994	(1) To assess changes in in-hospital RAMR of CABG patients after publication of mortality data in the NYS CSRS. (2) To determine whether mortality rate outlier status was associated with changes in CABG-related in-hospital RAMRs and changes in provider volume of CABG performed after NYS CSRS implementation	Hospitals in New York state performing CABG	New York hospitals treating 57,187 patients undergoing CABG (1989–1992)	****	Observational cohort	**	√√
Marshall, Fung, Chen	CHOP	Luce et al. 1996	To describe quality improvement activity after California CHOP report featuring risk- adjusted outcomes	Hospitals (non-federal) in California	17 of 22 public hospitals that are members of the California Association of Public Hospitals and Health Systems (1993–1994)	**	Cross sectional descriptive (survey)	*	√
Marshall, Fung, Chen	NYS CSRS	Peterson et al. 1998	To examine the impact of the NYS CSRS on in-hospital mortality rates by comparing mortality rates in New York to those in other states	Hospitals in New York state performing CABG	Medicare patients 65 years of age who underwent CABG in a US hospital (1987–1992)	****	Observational cohort with controls	***	√√√

Review	Initiative	First author, year	Objective	Domain 1:			Domain 2:		Global rating
				Subject of Reporting	Participants	Rating	Type	Rating	
Marshall, Fung, Chen	GCHQC	Rosenthal et al. 1997	To measure changes in hospital mortality that occurred after implementation of the CHQC reporting initiative, which publicly released in-hospital mortality rates	Hospitals in Cleveland Ohio	101 060 consecutive eligible discharges with eight diagnoses from 30 northeastern Ohio hospitals (1991–1993)	***	Observational cohort	**	√√
Marshall, Fung, Chen	GCHQC	Rosenthal et al. 1998	To measure quality improvement activity following release of CHQC reports of mortality rates, length of stay, and caesarean section rates (all measures adjusted for severity)	Hospitals in Cleveland Ohio	One academic and three community hospitals of varying size	**	Case series	*	√
Marshall, Schauffler, Fung, Chen	PHC4	Bentley & Nash 1998	To determine whether PHC4's Guide to CABG, which compared in-hospital mortality rates, led to more changes in Pennsylvania hospitals' CABG policies/practices than in New Jersey hospitals, which were not required to publicly report performance results	Hospitals in Pennsylvania providing CABG surgery	Key informants at hospitals identified by the chief executive officers of 21 Pennsylvania and eight New Jersey hospitals	***	Cross sectional descriptive (survey)	*	√
Marshall, Schauffler, Fung, Chen	Missouri obstetrics consumer report	Longo et al. 1997	To examine the impact of Missouri Department of Health's obstetrics consumer report. This provides a structure, process, and outcomes measures, on quality improvement activities and clinical outcomes	Hospitals in Missouri providing obstetric care.	All Missouri hospitals providing obstetrics care (1989–1994) + Key informants designated by hospital administrators at 82 hospitals (93% response rate) (1994)	***	Observational cohort/ Descriptive survey	**	√√
Marshall, Schauffler, Fung, Chen	HCFA hospital-specific mortality rates	Mennemeyer et al. 1997	To assess the relationship between the release of HCFA hospital-specific mortality rates and utilisation (discharges); to compare the impact of publicly releasing HCFA mortality rates to press reports of unexpected deaths, on utilisation	U.S. hospitals providing care to Medicare patients.	Community hospitals treating Medicare patients (1984–1992)	****	Observational cohort	**	√√
Marshall, Schauffler, Fung, Chen	NYS CSRS	Mukamel & Mushlin 1998	To measure the relationship between provider ratings in the NYS CSRS and rates of growth in fee-for-service market share	Hospitals in New York state performing CABG	All New York hospitals performing CABG (1990–1993)	***	Observational cohort	**	√√
Marshall, Schauffler, Fung, Chen	CHOP	Rainwater et al. 1998	To describe the impact of publicly reporting California's CHOP risk-adjusted 30 day inpatient mortality rates for patients with AMI on quality improvement activity	Hospitals (non-federal) in California	39 key informants at a sample of acute-care hospitals in California (1996–1997)	**	Cross sectional study through Interviews	*	√

Review	Initiative	First author, year	Objective	Domain 1:			Domain 2:		Global rating
				Subject of Reporting	Participants	Rating	Type	Rating	
Marshall, Schaufli, Fung, Chen	HCFA hospital-specific mortality rates	Vladeck et al. 1988	To examine the relationship between mortality rate outlier status and hospital occupancy rates before and after HCFA release of hospital mortality rates	Hospitals in New York state providing care to Medicare patients	All New York general acute hospitals serving Medicare patients (1985 to 1986) (i.e. comparison of 5 calendar quarters preceding public release & 3 calendar quarters post release)	****	Observational cohort	**	√
Marshall, Schaufli	PHC4	Schneider & Epstein 1998	To examine the awareness and use of statewide consumer guide that provides risk-adjusted, in-hospital mortality ratings of hospitals that provide cardiac surgery	Hospitals in Pennsylvania providing CABG surgery	A total of 474 (70%) of 673 eligible patients who had undergone CABG surgery during the previous year at one of four hospitals listed in the Consumer Guide as having average mortality rates between 1% and 5% were successfully contacted	***	Cross sectional study through telephone survey	*	√
Schauffli	PHC4	Maxwell 1998	To assess hospital executives' opinions of the usefulness and importance of the PCH4 information	Hospitals in Pennsylvania	Survey of hospital executives	**	Cross sectional survey	*	√
Marshall	HCFA hospital-specific mortality rates	Berwick & Wald 1990	To determine the reactions of hospital leaders to publicly released mortality data, and learn if hospitals with high mortality had different attitudes to those with low mortality	Hospitals in the US	National (US) sample of hospitals, stratified by mortality rate as at 1987 HCFA data release. Response rate of 78% (250 hospitals)	***	Cross sectional survey	*	√

Appendix 4B: Organisational provider studies – results

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Dranove & Sfekas 2008	√√	Selection, Allocative efficiency: When hospital report cards provide information that differs from patients' prior beliefs (measured as their preferences in the period prior to the publication of the report cards, i.e. 1989-1990), patients respond to this information by moving to higher quality hospitals. However, this effect is primarily due to shifting away from hospitals with negative news rather than shifting towards hospitals with positive news	↑			↑		
Castle 2009a, b	√	Selection: Thirty-one per cent of consumers used the Internet in choosing a nursing home, and 12% recalled using Nursing Home Compare. In general, the comprehension index scores were high, indicating good understanding	↑					
Mukamel et al. 2007	√	Quality improvement: Sixty-nine per cent of facilities reported reviewing their quality scores regularly and many have taken specific actions to improve quality. Forty-two per cent had changed the priorities of existing quality assurance programs. Homes with poor quality scores are more likely to take actions following the publication of the report card (e.g. reorganising staff, retraining staff, and changing care protocols)		↑				
Stevenson 2006	√√	Selection, Allocative efficiency: Effects on public nursing home occupancy as a result of public reporting have been minimal. Although some estimates of effect are statistically significant, they all suggest very small effect sizes	↔					
Duvalko et al. 2009	√	Not clear that outcomes reported on related to public release or many of the other aspects of initiatives. Purpose of the paper was descriptive rather than evaluative. The authors reported adherence with clinical practice guidelines of colorectal cancer surgery has increased between 2004 and 2006. Thirteen out of the fourteen Regional Cancer Programs (RCP) had a plan to meet the thoracic surgery standards in 2008. However, there were no relevant publicly reported indicators until May 2008. The authors also report that cancer surgical waiting time and the variability has decreased among different regions between 2005 and 2008						
Bundorf et al. 2009	√√	Selection, Allocative efficiency: Clinics with higher birth rates had larger market share after the adoption of report cards relative to before. Clinics with a disproportionate share of young, relatively easy-to-treat patients had lower market share after adoption versus before. Report cards had larger effects on consumers and clinics from states with ART insurance coverage mandates	↑			↑		
Drake et al. 2007	√√	Clinical outcomes, Unintended consequences: Increased success in meeting the pneumonia antibiotic timing measure correlates to an increase in pneumonia antibiotic use among the conditions selected (which do not call for antibiotic use)			↑↓			↓

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Friedberg et al. 2009	√√	Unintended consequences: Despite concerns, public reporting of hospital antibiotic timing scores has not led to increased pneumonia diagnosis, antibiotic use, or a change in patient prioritisation						↔
Guru et al. 2006	√√√	Clinical outcomes: The risk-adjusted 30 day mortality rate decreased 29% (95% CI 21-39) from the era of no reporting (1991–1993) to confidential reporting (1994–1998). There was no further decrease with public reporting (1999–2001). The control outcome of 30 day readmission did not decrease across reporting eras. In-hospital mortality fell significantly faster in Ontario during the period of confidential reporting than in other parts of Canada			↔			
Hollenbeak et al. 2008,	√√√	Clinical outcomes: Across six common conditions (AMI, CHF, hemorrhagic stroke, ischemic stroke, pneumonia, and sepsis), patients treated at hospitals operating in an environment of intensive public reporting had significantly reduced odds of in-hospital mortality when compared with propensity score matched patients from hospitals in more limited public reporting environments. Furthermore, Pennsylvania patients showed significant improvement in their odds of in-hospital mortality in 2000–2003 when compared with Pennsylvania patients in 1997–1999			↑			
Li et al. 2010	√√	Selection: Total CABG volume decreased from 2003 to 2006 by almost 27% but patient casemix for most hospitals and surgeons was unchanged Clinical outcomes: Despite similar patient characteristics, the operative mortality for patients in the highest risk group was 26% lower in 2006 than in 2003. However, there was no control in the study with which to compare this trends. Among surgeons with higher risk-adjusted mortality rates, there was a trend toward a lower operative mortality, although the majority of surgeons who performed CABG in both 2003 and 2006 had reductions in their risk-adjusted mortality rates Unintended consequences: No evidence of decreased access to CABG for high risk patients in California during the period of public reporting of isolated CABG outcomes	↔		↔			↔
Lindenauer et al. 2007	√√√	Clinical outcomes: Both groups showed improvement from the baseline. Hospitals engaged in both public reporting and pay for performance achieved modestly greater improvements in quality than did hospitals engaged only in public reporting			↑			
Merle et al. 2009	√	Selection, Allocative efficiency: In the case of a low ICALIN score, 24.1% of participants would refuse admission and 54.9% would seek advice from their general practitioner. Socio-demographic factors had no influence on patients' attitude	↑			↑		
Mukamel et al. 2008	√√	Clinical outcomes: Publication of the Nursing Home Compare report card was associated with improvement in some but not all reported dimensions of quality			↔			

Organisational provider studies – results

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Mukamel et al. 2009	√√	Unintended consequences: Despite the theoretical expectation, empirical evidence suggests only a limited degree of cream skimming						↔
Pope 2009	√√	Selection, Allocative efficiency, Unintended consequences: Hospitals that improve their rank are able to attract significantly more patients. The average hospital in the sample experienced a 5% change in non-emergency, Medicare patient volume from year to year due to rank changes	↑			↑		
Rask et al. 2006	√	Clinical outcomes: Participants in the Safe Medication Use initiative have seen reductions in targeted medication errors. Quality improvement: Hospital participation in PHA-sponsored programs has increased each year, with all eligible hospitals participating in at least one PHA program. Ninety-seven percent of the hospitals were participating in a comprehensive medication error reduction program		↑	↑			
Tu & Lauer 2009	√√√	Clinical outcomes: The mean 30 day AMI mortality rates were 2.5% lower in the early feedback group compared with the delayed feedback group. Early feedback hospital report card did not result in a significant system-wide improvement in either the composite AMI process of care indicator or the composite CHF process of care indicator Quality improvement: Hospitals in the early feedback group were significantly more likely to report starting one or more quality improvement initiatives (73.2% of early feedback group vs. 46.7% of delayed feedback group for AMI care and 61.0% of early feedback group vs. 50.0% of delayed feedback group for CHF care) in response to the publicly released early feedback report card. The nature and focus of the activities varied considerably by hospital. Approximately half of the early feedback hospitals reported that they introduced new or modified standard order sets and/or clinical pathways or care maps for AMI or CHF. Around 40% reported conducting initiatives to improve door-to-needle times for patients receiving fibrinolytic therapy		↑↓	↑↓			

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Werner, Konetzka & Kruse 2009; Werner, Konetzka, Stuart et al. 2009; Werner et al. 2010	√√√	<p>Clinical outcomes, Selection, Allocative efficiency: Improvements in measured quality (patients without pain, patients without delirium, patients whose walking improved) after the initiation of public reporting were due to both nursing home-specific quality improvements and changes in market share. Patients without pain: Nursing home specific showed 2.4 percentage point improvement, market share accounting for 1.6 percentage point increase. No delirium: Facility specific showed no increase and market share a 2.9 percentage point increase. Patients whose walking improved: Facility specific 0.3 percentage point increase, market share 1.1 percentage point increase</p> <p>Clinical outcomes: (1) Reported quality of post-acute care improved after the initiation of public reporting for two of the three reported quality measures used in Nursing Home Compare. However, rates of potentially preventable re-hospitalisation did not significantly improve and, in some cases, worsened. (2) Overall both unreported and reported care improved following the launch of public reporting. Improvements in unreported care were particularly large among facilities with high scores or that significantly improved on reported measures, whereas low-scoring facilities experienced no change or worsening of their unreported quality of care</p>	↑		↑			
Zinn et al. 2008	√	<p>Quality improvement: Close to two-third nursing homes administrators took some actions in responding to the public report. Whether, when, and how nursing homes reacted to publication of federally reported quality measures is associated with four strategic orientation types: Defender, Analyser, Prospector and Reactor. However, the study did not examine what types of actions were taken</p>		↑				
Baker et al. 2002; Baker et al. 2003	√√	<p>Selection, Allocative efficiency: No relationship overall between higher than expected mortality rates and market share</p> <p>Clinical outcomes: Hospital outlier status was not related to changes in risk-adjusted 30 day mortality overall</p> <p>Unintended consequences: Risk-adjusted in-hospital mortality declined for most conditions, but mortality rate in the early post-discharge period rose for most conditions and the 30 day mortality rate declined for only heart failure and obstructive pulmonary disease and increased for stroke</p>	↔		↔	↔		↑↓
Chassin 2002	√√	<p>Selection, Allocative efficiency: Small changes in market share and less than half the time in the expected direction</p> <p>Quality improvement: Increase in quality improvement activity (e.g., staffing policy changes, multidisciplinary approach to examining care processes, changes in operating room schedule)</p>	↔	↑		↔		
Clough et al. 2002	√√	<p>Clinical outcomes: No statistical difference in rate of decline in combined mortality in Cleveland compared with the rest of the Ohio</p>			↔			

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Dranove et al. 2003	√√√	<p>Allocative efficiency: (1) Report cards led to a decline in the illness severity of patients receiving CABG in New York and Pennsylvania relative to patients in states without report cards, as measured by hospital utilisation in the year prior to admission for surgery. In addition, report cards led to significant declines in other intensive cardiac procedures for relatively sick AMI patients. (2) Second, report cards led to increased sorting of patients to providers on the basis of the severity of their illness. In particular, hospitals in New York and Pennsylvania experienced relative declines in the within hospital heterogeneity of their AMI patient populations, with those two states' teaching hospitals picking up an increasing share of patients with more severe illness. (3) For healthier patients, led to small decline in readmission with heart failure</p> <p>Technical efficiency: Led to higher levels of Medicare Hospital expenditures (although finding was not statistically significant) and greater rates of adverse outcomes, including increased rate of readmission. Hospital expenditures in the year after admission increased not only for healthier AMI patients but also for the sicker ones. Surprisingly, report cards also led to increased expenditures for the most severely ill patients (second row), even though they were no more likely to receive CABG and were less likely to receive PTCA</p> <p>Clinical outcomes: Report cards increased significantly the average rate of readmission with heart failure by approximately 0.5 percentage point. They also provide statistically marginal evidence that the average mortality rate in New York and Pennsylvania increased by 0.45 percentage point on a base of 33%</p>	↓		↓	↓	↓	↓
Ghali et al. 1997	√√√	<p>Clinical outcomes: RAMR reductions in Massachusetts were similar to mortality reduction in New York and northern New England; unadjusted mortality trends were similar in Massachusetts, New York, northern New England, and the United States</p>			↔			

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Hibbard et al. 2003, 2005	√√√	<p>Selection, Allocative efficiency: No changes in market share for hospitals with publicly reported data. There were no shifts away from low rated hospitals towards high rated hospitals in overall discharges or in obstetric or cardiac care cases. No results given for internal or no reporting groups</p> <p>Quality improvement: Quality Counts hospitals did not engage in different strategies of quality improvement overall. In areas where there were public or private reports (maternity and cardiac care), public report hospitals reported a higher number of quality improvement activities (3.4 obstetrics, 2.5 cardiac) compared with private report hospitals (2.5 obstetrics, 1.5 cardiac) and no report hospitals (2.0 obstetrics, 1.4 cardiac). Differences were statistically significant</p> <p>Clinical outcomes: For obstetrics, around one-third of hospitals in the public report condition significantly improved their performance, while only 5% declined. Around 25% of private report hospitals showed a significant increase and 14% declined. Around 12% of no report hospitals significantly improved their performance and around 12% declined. Public report hospitals were 32% more likely to report improvements compared with private report hospitals and almost 3 times more likely than compared with no report hospitals. Results for cardiac care mirrored those for obstetrics but failed to reach statistical significance</p>	↔	↑	↑	↔		
Jha & Epstein 2006	√√	<p>Selection, Allocative efficiency: No relationship between ranking and subsequent market share</p>	↔			↔		
Mannon et al. 2005	√	<p>Allocative efficiency: Ratings transmitted important priorities from central government and helped direct and concentrate front-line resources</p> <p>Unintended consequences: Public reporting led to tunnel vision, distortion of clinical priorities, and disincentive to improve performance among high rated organisations</p>				↑		↓
Moscucci et al. 2005	√√	<p>Clinical outcomes: Unadjusted mortality rates were lower in New York than Michigan, but adjusted mortality rates were not statistically different</p> <p>Unintended consequences: Significant casemix differences between patients undergoing PCI in Michigan and New York, suggesting a propensity in New York toward not intervening on high risk patients</p>			↔			↓
Omoigui et al. 1996	√√	<p>Allocative efficiency, Unintended consequences: Patients from New York receiving CABG at the Cleveland Clinic had higher expected mortality than the New York state-wide mix, patients from Ohio, and patients from other states or countries</p>				↑		↓

Organisational provider studies – results

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Romano & Hong 2004	√√	Selection, Allocative efficiency: No statistically significant AMI-related volume changes among outlier hospitals; slight increase in lumbar discectomy-related volume for low-complication outliers; transient increase in CABG volume for low-mortality hospitals and transient decrease in volume for high-mortality outliers	↑↓			↑↓		
Tu & Cameron 2003	√	Quality improvement: 54% of respondents indicated that their hospitals commenced one or more quality improvement initiative in response to public reporting		↑				
Dziuban Jr et al. 1994	√	Clinical outcomes: Excess mortality was localised to high-acuity patients undergoing emergent CABG; mortality decreased to 0% over one year after a focused effort to optimise management of these patients Quality improvement: Quality improvement activity increased (change in timing and technique used for patients undergoing emergent CABG, change in hospital policies)		↑	↑			
Hannan, Kilburn Jr et al. 1994; Hannan, Kumar et al. 1994	√√	Selection, Allocative efficiency: No association overall between mortality rate outlier status and hospital volume Clinical outcomes: RAMR decreased across all hospitals from 4.17% to 2.45%. Reductions in RAMR occurred, especially among hospitals that had highest initial mortality rates. There was convergence in RAMR among hospitals initially identified as high, medium, and low performers	↔		↑	↔		
Luce et al. 1996	√	Quality improvement: Minimal impact on quality improvement activity.		↔				
Peterson et al. 1998	√√√	Clinical outcomes: Both unadjusted and risk- adjusted mortality rates in New York decreased more than in other states Unintended consequences, Allocative efficiency: New York patients with AMI were less likely to receive CABG than those admitted outside New York, but the overall percentage increased, paralleling national trends, even among higher risk elderly subsets; out-of-state CABG rates decreased			↑	↔		↔
Rosenthal et al. 1997	√√	Clinical outcomes: Risk-adjusted mortality for most conditions declined from 7.5% to 6.8% (July-December 1992), 6.8% (January–June 1993), and 6.5% (July–December 1993) for three periods after publication; decreases in mortality rates were statistically significant in weighted linear regression analyses for heart failure (0.50% per period) and pneumonia (0.38% per period)			↑			
Rosenthal et al. 1998	√	Quality improvement: Quality improvement activities increased (e.g., interdisciplinary process improvement teams, review of processes of care, development of practice guidelines)		↑				

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Bentley & Nash 1998	√	Quality improvement: Response in Pennsylvania hospitals (e.g., recruited staff, started continuous quality improvement program to improve CABG procedures); more changes in Pennsylvania than New Jersey hospitals (no formal statistical testing because the sample was small)		↑		↑		
Longo et al. 1997	√√	Clinical outcomes: Outlier hospitals had improvements in rates of ultrasonography, vaginal birth after caesarean section, and caesarean section. Quality improvement: Hospitals instituted services (e.g., hospital policy that infants ride in car seats upon discharge, formal neonatal transfer agreements) after the reports were published		↑	↑	↑		
Mennemeyer et al. 1997	√√	Selection, Allocative efficiency: Hospitals with mortality rates twice that expected by HCFA had less than one fewer discharges per week in the first year; press reports of single, unexpected deaths were associated with 9% decrease in hospital discharges within one year	↔			↔		
Mukamel & Mushlin 1998	√√	Selection, Allocative efficiency: Hospitals with better outcomes experienced higher rates of growth in market share	↑			↑		
Rainwater et al. 1998	√	Quality improvement: Minimal impact on quality improvement activity (two thirds of respondents indicated no specific activity)		↔				
Vladeck et al. 1988	√	Selection, Allocative efficiency: Occupancy rates were used as a proxy for measuring changes in choice of hospital. No statistically significant effect on occupancy rates	↔			↔		
Schneider & Epstein 1998	√	Selection, Allocative efficiency: Ninety-three (20%) of patients were aware of the Consumer Guide but only 56 (12%) knew about it before surgery. Among the 56 patients, 18 reported knowing the hospital rating and seven reported knowing the surgeon rating, 11 said hospital and/or surgeon ratings had a moderate or major impact on their decision making, but only four were able to specify either or both correctly. When the Consumer Guide was described, 273 (58%) reported that they probably or definitely would change surgeons if they learned that their surgeon had a higher than expected mortality rate in the previous year	↔			↔		
Maxwell 1998	√	Technical efficiency: There were no significant trends toward a reduction in the dispersion of charges during the study period. Most hospital executives assigned low ratings of importance to published comparative charges information; however, executives of high-competition hospitals assigned significantly higher importance ratings to the information as a whole in encouraging hospital competition based on quality					↔	
Berwick & Wald 1990	√	Quality improvement: Thirty one percent of respondents said that they used the externally released mortality data to guide their study and efforts to improve quality. Hospitals in the high mortality group were more likely than others to report that they had used the data in this way		↑				

Appendix 5A: Health plan studies – quality assessment

Category Label	Context	Specific Initiative	Measures system	First author, year	Objective	Domain 1:			Domain 2:		Global rating
						Subject of Reporting	Participants	Rating	Type	Rating	
Chen	Medicare Advantage (Medicare HMOs)		HEDIS measures and CAHPS	Dafny & Dranove 2008	To examine the relationship between enrolment and quality before and after report cards were mailed to 40 million Medicare beneficiaries in 1999 and 2000	All Medicare beneficiaries before and after the public reporting of HMO in 1999 and 2000 the US	40 million Medicare beneficiaries, of which around 12% are HMO enrollees	****	Observational cohort	***	√√
Fung, Chen	Employment based insurance choices	GM HMO Options Guide	HEDIS and patient satisfaction ratings	Chernew et al. 2008; Scanlon et al. 2002	To estimate the impact and value of information using data from a large employer (General Motors, GM), which started distributing health plan ratings to its employees in 1997. Quality information provided included HEDIS and patient satisfaction ratings on plan choices	All, non-union US GM employees between 1996 and 1997 (around 70,000 employees)	1996 and 1997 health plan enrolment decisions for the approximately 70,000 active, non-union US GM employees	***	Observational cohort	***	√
Fung, Chen	Medicaid HMOs	Medicaid in New Jersey	CAHPS	Farley, Short et al. 2002	To assess effects of providing CAHPS information on plan choices	HMO Medicaid plans in New Jersey	Medicaid beneficiaries in New Jersey 1998	**	RCT	****	√
Fung, Chen	Medicaid HMOs	Medicaid in Iowa	CAHPS	Farley, Elliott et al. 2002	To assess effects of providing CAHPS information on plan choices	HMO Medicaid plans in Iowa	Medicaid beneficiaries in Iowa, 2000	**	RCT	****	√
Fung, Chen	Employment based insurance choices	Harvard University employees insurance plans	HEDIS measures	Beaulieu 2002	To assess effects of providing health performance data (HEDIS measures, patient satisfaction) on consumers' enrolment decisions	Private health plans available to Harvard University employees	Harvard University employees (1994–1997)	***	Observational cohort	**	√

Category Label	Context	Specific Initiative	Measures system	First author, year	Objective	Domain 1:			Domain 2:		Global rating
						Subject of Reporting	Participants	Rating	Type	Rating	
Fung, Chen	Employment based insurance choices	Federal Employee Health Benefit guide	Specific consumer satisfaction measures	Wedig & Tai-Seale 2002	To assess effects of providing quality ratings from the Federal Employee Health Benefit guide on consumers' plan choices	Private health plans available to US federal employees	Federal employees with HMO coverage residing in counties with ≤ unique plans (1995–1996)	***	Observational cohort	**	√√
Fung, Chen	Employment based insurance choices	Federal Employee Health Benefit guide	HEDIS measures	Jin & Sorensen 2006	To assess effects of providing NCQA quality ratings from the Federal Employee Health Benefit guide on plan choices	Private health plans serving US federal employees	Former federal employees (retirees) and surviving family of deceased federal employees (1995–2000)	***	Observational cohort	**	√√
Fung, Chen	Employment based insurance choices	US commercial health plans	HEDIS measures and CAHPS	Bost 2001	To compare HEDIS and CAHPS results for plans that publicly report data with those who do not, over a three-year period	US commercial health plans	Commercial health plans (1997–1999)	***	Observational cohort	*	√
Fung, Chen	Employment based insurance choices	US commercial health plans	HEDIS measures	McCormick et al. 2002	To compare the relationship between health plan performance and participation in public reporting programs	US commercial health plans (HMO only)	HMO health plans (1997–1999)	***	Observational cohort	*	√
Marshall, Schauffler	Employment based insurance choices	Sample of employers	HEDIS measures and NCQA accreditation	Gabel et al. 1998	To examine the impact that the availability of NCQA accreditation and HEDIS data has on employer purchasing decisions regarding employee health plans	Health plans in the US	Random sample of 1,151 private and public sector employers in the US, 1997. Employers surveyed select health plans for privately insured adults in the US	**	Cross-sectional (survey)	*	√
Marshall, Schauffler	Employment based insurance choices	Private employer not identified	HEDIS, specific consumer satisfaction, hospital outcomes measures	Hibbard et al. 1997	To examine the self reported impact of the availability of quality information on health plans, on the decisions made by employer based purchasers	Employer based purchasers of insurance plans in the US, 1997	Representatives from 33 large employers that purchase insurance for 1.8 people	**	Cross-sectional survey	*	√

Category Label	Context	Specific Initiative	Measures system	First author, year	Objective	Domain 1:			Domain 2:		Global rating
						Subject of Reporting	Participants	Rating	Type	Rating	
Schauffler	Employment based insurance choices	Private employer not identified	HEDIS measures	Chernew & Scanlon 1998	To examine the impact of the availability of quality reports of HEDIS measures on choice of health plan for employees of a Fortune 100 company during 1995	Health plans offered by the company	Active non-union employees receiving single (vs.family/couple) insurance coverage though a large US Fortune 100 company, located in markets with 20 or more employees. Sample of 5,795	**	Observational cohort	**	√√
Schauffler	Employment based insurance choices	Private employer not identified	HEDIS measures	Scanlon & Chernew 1999	To examine the impact of the availability of quality reports of HEDIS measures on choice of health plan for employees of a Fortune 100 company during 1996 (the same company as reported in Chernew and Scanlon 1998)	Health plans offered by the company	Active non-union employees receiving single or family/ couple insurance coverage though a large US Fortune 100 company, located in markets with 20 or more employees. Sample of 46,486 employees of which 26,720 chose managed care plans	**	Observational cohort	**	√√
Schauffler	Employment based insurance choices	Minnesota state employees	Specific consumer satisfaction measures	Knutson et al. 1998	To compare the impact of a consumer assessment report on knowledge of health plans, changes in preferences for health plan attributes, changes in ratings of quality of health plans and choice of health plans. The experimental group had received the consumer assessment report card three times over six years with control groups had not received the report cards	Health plans offered by the state to employees	State public sector employee in Minnesota (57,000 employees; 144,000 employees and covered dependents) in 1994, 1995 and 1996	**	Cross-sectional, quasi-experimental non-equivalent control	**	√√

Hypothetical Studies of Plan Choices

Category Label	Context	Specific Initiative	Measures system	First author, year	Objective	Domain 1:			Domain 2:		Global rating
						Subject of Reporting	Participants	Rating	Type	Rating	
Fung, Chen	Hypothetical experiment		CAHPS	Spranca et al. 2000	To assess effects of providing CAHPS information about hypothetical health plans on plan choices	Hypothetical plans (Los Angeles; laboratory settings)	Privately insured adults in US	**	Experimental study	****	√
Fung, Chen	Hypothetical experiment		CAHPS	Harris 2002	To investigate the impact of expert-assessed and consumer-assessed quality ratings on willingness to enrol in hypothetical health plans that restrict provider access	Hypothetical plans (Los Angeles; laboratory setting)	Privately insured adults in US	**	Experimental study	****	√
Schauffler	Hypothetical experiment		HEDIS and CAHPS	Sainfort & Booske 1996 Booske et al. 1999	To examine (1) what people say is important to them in choosing a health plan; (2) the effect, if any, that giving health plan information has on what people say is important to them; and (3) the effect of preference elicitation methods on what people say is important	Hypothetical plans (Wisconsin; laboratory setting)	Random sample of 201 Wisconsin state employees	**	Experimental study	****	√

Appendix 5B: Health plan studies – results

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Dafny & Dranove 2008	√√√	Selection, Allocative efficiency: The study attempted to estimate the separate impact of the public report card (in 1999/2000) and the impact of other market- based learning (e.g. word of mouth, prior experience, current experience, information including quality measures provided directly by the HMO, scores published in US News and World report). The authors found Medicare care enrollees were switching into higher quality plans throughout the period 1994-2002, independently of government report cards. This trend was strongest in markets in which a private sector report card (US News and World Report) was available. After controlling for market learning, there was an additional response to government provided Medicare report cards. This appears mostly related to the 'satisfaction' scores, with no evidence that other measure affected choice. The study only examined a limited number of measures (satisfaction, mammography, screening and prevention). Effects are greatest in markets where there is greater variation in quality. Impacts were mainly related to switching between plans and not attracting new enrollees from the fee for service (FFS) Medicare alternative. The authors estimate, based on simulation models, that there is a 'net switching' rate of 3.1% of Medicare enrollees nationwide (including both FFS and Medicare HMO enrollees). Within HMO enrollees it is estimated that the switching rate is 12%	↑			↑		
Chernew et al. 2008 Scanlon et al. 2002	√√	Selection, Allocative efficiency: Chernew (2008): The release of health plan rating had a statistically significant effect on health plan choices, but the effects were modest. Around 3% of people switched plans as a result of the release of ratings. Modelling implies a value on the information provided through the report cards of around \$20 per person. Consumers were willing to pay about \$330 per year per to avoid plans with below expected performance ratings. There were large variation in valuations across different performance domains, with people valuing medical and surgical care quality, satisfaction and access measures the most. Scanlon (2002): Employees avoided plans with many below-average ratings and would be willing to pay more to avoid plans with lower ratings, but they were not strongly attracted to plans with many superior ratings	↑			↑		
Farley, Short et al. 2002	√√	Selection, Allocative efficiency: Medicaid beneficiaries assigned to experiment and control groups. Experimental groups were mailed a quality report on HMOs. No effect on HMO (plan) choices was detected. Only about a half of beneficiaries indicated they received or read the quality report. There was some limited evidence that a small group of beneficiaries who received and read the report choose plans with higher quality rating other than the dominant plan in the geographic region	↔			↔		

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Farley, Elliott et al. 2002	√√	Selection, Allocative efficiency: Medicaid beneficiaries assigned to experiment and control groups. Experimental groups were mailed a quality report on HMOs. No effect on HMO choices was found for new Medicaid beneficiaries. When beneficiaries could choose between HMOs with different CAHPS ratings, those assigned to lower-rated HMOs switched to the higher-rated HMO at a greater rate than those in the higher-rated HMO switched to the lower-rated one, independently of CAHPS information	↔			↔		
Beaulieu 2002	√√	Selection, Allocative efficiency: Provision of quality information had a small but statistically significant effect on health plan choices. Employees were more likely to switch from plans with lower reported quality	↑			↑		
Wedig & Tai-Seale 2002	√√	Selection, Allocative efficiency: Dissemination of report cards on consumer satisfaction influenced plan selection; employees were likely to select plans with better quality ratings. Effects were stronger for new federal employees, but were evident for all federal employees	↑			↑		
Jin & Sorensen 2006	√√	Selection, Allocative efficiency: NCQA plan rating provided through the guide had a meaningful influence on individual's choices, particularly for individuals choosing a plan for the first time. A small fraction of individual decisions were materially affected by the information. Study estimates value of quality information at \$US3.39 per person per year	↑			↑		
Bost 2001	√	Clinical Outcomes: Health plans that publicly reported their HEDIS rates were compared with plans that did not publicly report rates. Public reporting plans performed better on (a) preventive health measures and (b) patient experience measures (except communication). They also showed higher levels of improvement on some newer clinical measures (such as beta-blocker treatment after heart attack)			↑			
McCormick et al. 2002	√	Unintended consequences: Lower-scoring plans were more likely than higher-scoring plans to stop disclosing publicly their quality data						↑↓
Gabel et al. 1998	√	Selection, Allocative efficiency: NCQA accreditation and HEDIS reports play a relatively minor but growing role in employers' decision to select health plans. An estimated 11% of employers offering a HMO plan indicated NCQA accreditation was "very important" and 5% identified HEDIS data as "very important". 9% of employers required NCQA accreditation. Only 1% provided HEDIS data to assist employees in choosing their health plans	↑					

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Hibbard et al. 1997	√	Selection, Allocative efficiency: Use of clinical quality information among the purchasers surveyed was low and not all purchasers were aware that performance data was available. Many purchasers indicated that quality and outcomes were important to them, but when asked what performance information is most influential in their decisions, they listed consumer satisfaction followed by NCQA accreditation. Purchasers' awareness of the availability of hospital outcomes data was associated with strategies used by data producing organisations, with awareness higher in regions specifically targeted to receive quality report cards. Purchasers do not always understand the intent of the quality indicators and do not always interpret them correctly	↔			↔		
Chernew & Scanlon 1998	√√	Selection, Allocative efficiency: Employees did not appear to respond strongly to plan performance measures, even when labelling and dissemination were intended to facilitate their use	↔			↔		
Scanlon & Chernew 1999	√√	Selection, Allocative efficiency: Plan ratings did not have a major influence on plan enrollment	↔			↔		
Knutson et al. 1998	√√	Selection, Allocative efficiency: The consumer report card had few discernible effects on employees' knowledge, attitudes or choice of health plan. The only impact was a related to perceptions of employees on how knowledgeable they felt they were about health plans	↔			↔		

Hypothetical Studies of Plan Choices

Study	Global rating	Key findings	Selection	Quality improvement	Clinical outcomes	Allocative efficiency	Technical efficiency	Unintended consequences
Spranca et al. 2000	√	Selection, Allocative efficiency: Overall consumers preferred plans with more benefits and higher premiums to those with fewer benefits and lower premiums. With the provision of CAHPS information, consumers did not change choices where more expensive plans had higher quality ratings. However participants were willing to choose less expensive plans that restrict benefits/services when those plans had high CAHPS ratings. This provides evidence that access to information on consumer ratings of plans can influence plan choices, and that this can occur within a context of cost containment	↑			↑		
Harris 2002	√	Selection, Allocative efficiency: Provision of quality information about quality reduced importance of other provider network features. However the level of quality differences needed to be high to have an impact on choices. There were no statistically meaningful differences between expert and consumer quality ratings	↑			↑		
Sainfort & Booske 1996 Booske et al. 1999	√	Selection, Allocative efficiency: The provision of quality information changes the preference structures of individuals. However, coverage and costs remained the primary attributes impacting choice cited by study participants before and after the provision of quality information	↑			↑		

Appendix 6: Provider reporting initiatives that have been evaluated

Initiative name	Units compared	Nature of measures	Description of measures	How was information released	Commenced	Ceased	Timeliness of release	Web site reference
HCFA hospital-specific mortality rates	Hospitals	Mortality rates	Hospital specific mortality rates for Medicare patients	Originally FOI request. Then by press conference and press release followed by reports	1987	1993	Did not specify	n.a.
Greater Cleveland Health Quality Choice (GCHQC)	Hospitals	Risk-adjusted mortality and risk-adjusted length of stay	Broad spectrum of hospital outcomes, including patient satisfaction, in-hospital mortality, length of stay, hospital-acquired complications, and cesarean section rates for adult medical, surgical, obstetrical, and intensive care patient	Published in local newspapers and on television.	Implemented in 1989 with public release around 1993	Dec-98	Every six months.	n.a.
NYS CSRS	Hospitals and individual surgeons	In-hospital mortality following CABG	No. of cases, in-hospital mortality (observed, expected, risk-adjusted and 95% CI) following CABG. Flag hospitals/ surgeons with higher and lower than expected risk-adjusted mortality	PDF report available through the internet. Original data published in press	1990. Original release was in 1990 (hospital). Surgeon-level information released in 1991	Ongoing	Lag is around 3 years.	www.nyhealth.gov/statistics/diseases/cardiovascular/
New York PCI Reporting System	Hospitals and surgeons	Risk-adjusted mortality associated with PCI	No. of cases, risk-adjusted mortality rate, and 95% confidence intervals	PDF report available through the internet	1995	Ongoing	Lag is around 3 years.	www.nyhealth.gov/statistics/diseases/cardiovascular/
Pennsylvania Health Care Cost Containment Council (PHC4)	Hospitals	Risk-adjusted in-hospital mortality, readmissions, lengths of stay, and hospital charges		Website	Commenced in 1989, suspended in 1994 to concentrate on AMI report (1996) and CABG report (1998). Resumed regular reporting in 1999	Ongoing	Lag is around 1 year. Produced annually.	http://www.phc4.org/

Initiative name	Units compared	Nature of measures	Description of measures	How was information released	Commenced	Ceased	Timeliness of release	Web site reference
California CABG Outcomes Public Reporting Program (CCORP)	Hospitals	Risk-adjusted operative mortality and post-operative stroke for CABG procedure	For death: total CABG cases, no. of isolated CABG cases, no. isolated CABG deaths, observed mortality rate (%), expected mortality rate (%), risk-adjusted mortality rate (%), RAMR), 95% CI for RAMR, performance rating (better than expected, as expected, worse than expected). Similar reports for post-operative stroke	Website	1995 as a voluntary program, became mandatory in 2000	Ongoing	Lag is around 3 years: 2007 report published in 2010.	http://www.oshpd.ca.gov/HID/Products/ClinicalData/CABG/index.html
California Hospital Outcomes Project (CHOP)	Hospitals	Range of hospital based measures including mortality, post-operative complications and readmission rates.	No. of cases, observed and expected death/ complications and readmissions rates, including risk-adjusted measures with confidence limits. Initially reported on in-hospital mortality within 30 days (acute myocardial infarction [AMI]), reported post-operative complications (discectomy, delivery), post-operative length of stay (discectomy), and readmission within 6 weeks (delivery). Later added outcomes relating to intensive care and community acquired pneumonia	Website	1993	2002	Variable	http://www.oshpd.ca.gov/HID/Products/ClinicalData/CABG/index.html
QualityCounts	Hospitals	Range of hospital based measures adapted from HCUP Quality Indicators.	Hospitals rated as better than expected, as expected, or worse than expected. Indices of adverse events (deaths and complications) occurring within the broad categories of surgery and non surgery, and three individual clinical areas: hip/knee surgery, cardiac care, and obstetric care	Website	1999	Ongoing	Did not specify	http://www.the-alliance.org/Default.aspx (Reports currently only available to members)
Georgia Partnership for Health and Accountability (PHA)	Hospitals	Performance on key indicators	Measures relating to heart attack, heart failure, infection prevention, pneumonia and pregnancy and comparisons with rates for top 10 national hospitals, national average and statewide threshold set for measure. Example heart attack indicators include % of heart attack patients given aspirin on arrival and at discharge, % given smoking cessation advice/counseling, % given PCI within 120 minutes of hospital arrival	Website	1999	Ongoing	Annual	http://www.gahospitalqualitycheck.org/mapindex.asp

Provider reporting initiatives that have been evaluated

Initiative name	Units compared	Nature of measures	Description of measures	How was information released	Commenced	Ceased	Timeliness of release	Web site reference
Missouri obstetrics consumer report	Hospitals	Obstetrical quality-of-care indicators on structure, process, and outcomes for each facility doing deliveries.	Structural variables include: ALOS; no. of births, level of perinatal care, availability of labour, delivery and recovery beds; process variables include caesarian delivery rate, ultrasound rate, vaginal delivery after caesarian section rate and very low birth weight; and outcome variables include neonatal mortality and patient satisfaction		1994	Ceased, unknown year		n.a.
US ART Clinics	Fertility clinics	Birth rate and age distribution of patients	3 year and 1 year lagged birth rate by type of cycle (i.e. fresh embryos from non-donor eggs, frozen embryos from non-donor eggs, and donor eggs)	Website	1998	Ongoing	Lag is 2 years, e.g. 2007 data reported in 2009	http://www.cdc.gov/art/ARTReports.htm
Nursing Home Compare	Nursing homes	Star rating based on overall, health inspections, staffing and quality	Detailed description of construct of star rating on website	Website	2002	Ongoing	Did not specify	http://www.medicare.gov/NHCompare/Include/D ataSection/Questions/ProximitySearch.asp
Hospital Quality Alliance (HQA) - a predecessor of Hospital Compare (see below)	Hospitals	Population based reporting of quality measures	26 Core Measures in four areas: heart failure, AMI, pneumonia, surgical infection prevention					
Hospital Quality Incentive Demonstration (HQID)	Hospitals	Risk-adjusted hospital based measures	More than 30 nationally defined, standardized, risk-adjusted measures representing process of care, as well as patient outcomes for 5 clinical areas: AMI/ heart attack; CABG; heart failure; pneumonia; hip and knee replacements	Website	2003	Ongoing	Annual	http://www.premierinc.com/quality-safety/tools-services/p4p/hqi/results/index.jsp
Hospital Compare	Hospitals	Process of Care, outcome of care, use of medical imaging, survey of patients' hospital experiences	Outcomes of care measures include 30 day risk-adjusted death rates for heart attack, heart failure and pneumonia and 30 day risk-adjusted rate of readmission	Website	2002	Ongoing	Quarterly	http://www.hospitalcompare.hhs.gov/hospital-search.aspx?loc=10009&lat=40.8426742&lng=-73.9425354&stype=GENERAL

Initiative name	Units compared	Nature of measures	Description of measures	How was information released	Commenced	Ceased	Timeliness of release	Web site reference
US News and World Report Hospital Rankings	Hospitals	Rankings of hospitals based on death rates, procedure volume, and balance of nurses and patients, across 16 specialties		Website	1990	Ongoing	Annual	http://health.usnews.com/health-news/best-hospitals/articles/2010/07/14/best-hospitals-2010-11-the-methodology.html
NHS Star Rating	Acute Care Trusts (hospitals), Primary Care Trusts, Mental Health Trusts and Ambulance Trusts	Overall rating, ratings against key targets, overall performance against key targets (pass/fail), ratings on balanced score card areas (high, medium, low)		Website	2001	2010	Annual	Previous: ratings2005.healthcarecommission.org.uk, Later became Annual Health Check managed by the Quality Care Commission: http://www.cqc.org.uk/guidanceforprofessionals/nhstrusts/annualassessments/annualhealthcheck2005/06-2008/09.cfm
UK Adult Cardiac Surgery Audit	Hospitals & surgeons	Survival rates for heart bypass, valve repair or replacement, and other cardiac operations		Website	2005	Ongoing	Annual	http://heartsurgery.cqc.org.uk/Survival.aspx
Ontario ICES Atlas	Hospitals	Range of measures including AMI and CHF outcomes, including mortality and readmission rates		Website	First Atlas published in 1999	Ongoing	Variable, last published in 2006	http://www.ices.on.ca/webpage.cfm?site_id=1&org_id=31&morg_id=0&gsec_id=0&item_id=1390
Ontario, CABG	Hospitals	Range of hospital based measures including mortality, length of stay and readmission rates.	Crude and risk-adjusted measures for: in-hospital mortality, 30 day mortality, mean postoperative length of stay for CABG patients, ICU length of stay, blood transfusion (red blood cells, plasma and platelet); arterial graft use	Website	1999	Ongoing	Annual	http://www.ccn.on.ca/pdfs/Rep_Cor_Art_Bypass_Surg_ON_F.pdf

Provider reporting initiatives that have been evaluated

Initiative name	Units compared	Nature of measures	Description of measures	How was information released	Commenced	Ceased	Timeliness of release	Web site reference
Ontario, EFFECT Study	Hospitals	AMI and CHF measures focused on in-hospital process of care measurements	In-hospital process of care measurements such as use of beta-blockers, ACE inhibitors prescribed at discharge, lipid measurement within 24 hours of admission.		2004 (retrospective chart review of 1999–00 and 2000–01 data)	2006–07 (retrospective chart review of 2004–05 data)	Time-limited, retrospective review	http://www.ices.on.ca/webpage.cfm?site_id=1&org_id=68&morg_id=0&gsec_id=0&item_id=3121&type=report
Cancer System Quality Index (CSQI)	Regions	Measurement of performance across 30 evidence-based measures spanning the cancer continuum from prevention to end-of-life care		Website	2003	Ongoing	Biennial	http://csqi.cancercare.on.ca/cms/One.aspx?portalId=63405&pageId=63417
France Infection Control Activity	Hospitals	Infection control performance	Infection control report card: score between 0 and 100, and a class between A and E	Website	2006	Ongoing	Lag is around 2 years, e.g. 2008 data most current available in 2010	http://translate.google.com.au/translate?hl=en&sl=fr&tl=en&u=http%3A%2F%2Fwww.icalin.sante.gouv.fr%2F

Appendix 7: Sample screens from reporting initiatives



Figure 5 NCQA Health Plan Report Card

Figure 1: In-Hospital/30-Day Risk-Adjusted Mortality Rates for Isolated CABG in New York State, 2007 Discharges

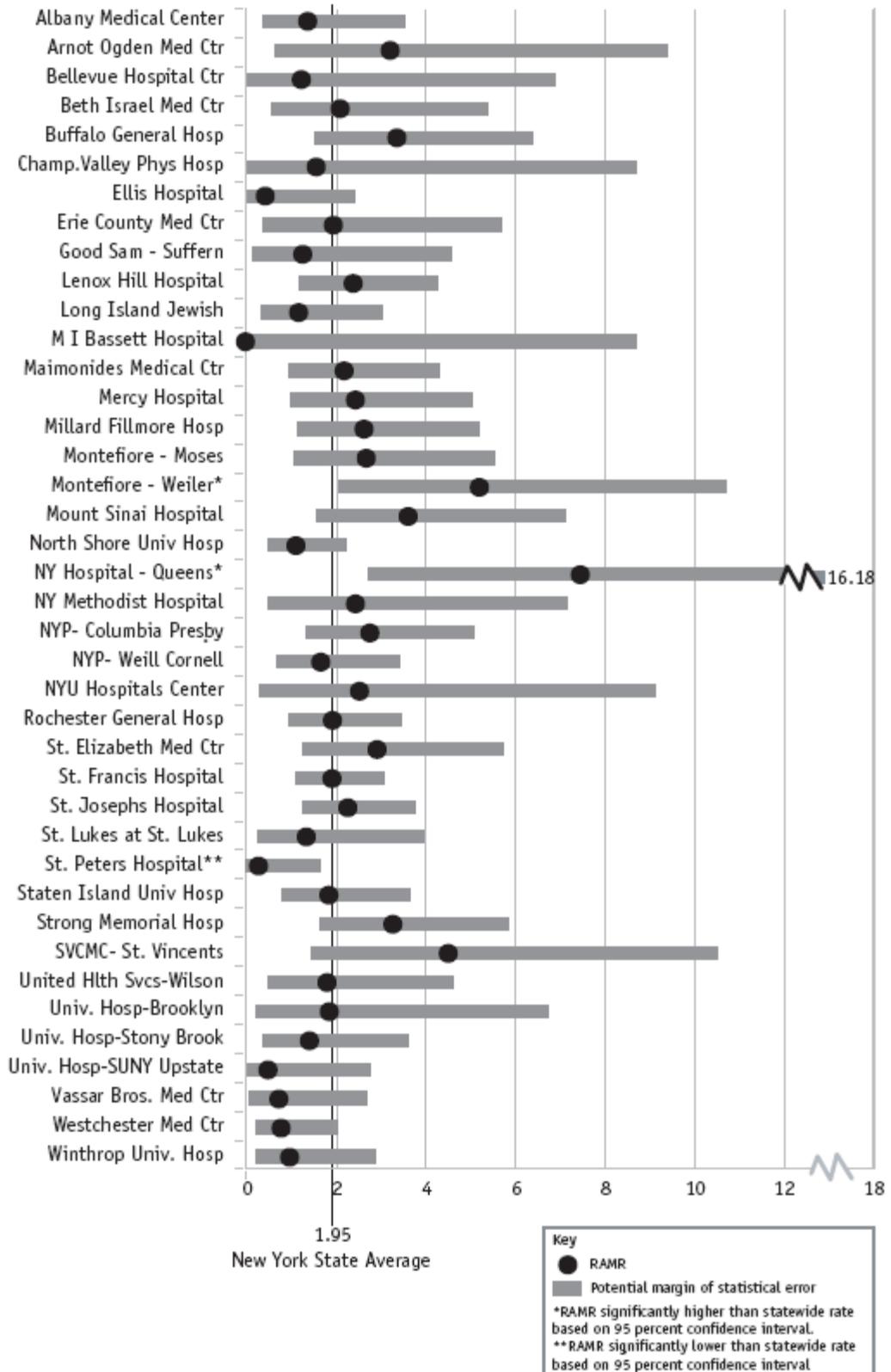


Figure 6. New York Cardiac Surgery Reporting System – graphical display

Table 2: In-Hospital/30-Day Observed, Expected and Risk-Adjusted Mortality Rates for Isolated CABG Surgery in New York State, 2007 Discharges (Listed Alphabetically by Hospital)

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	331	4	1.21	1.71	1.38	(0.37, 3.53)
Arnot Ogden Med Ctr	125	3	2.40	1.46	3.21	(0.64, 9.38)
Bellevue Hospital Ctr	136	1	0.74	1.16	1.24	(0.02, 6.88)
Beth Israel Med Ctr	245	4	1.63	1.52	2.10	(0.56, 5.37)
Buffalo General Hosp	354	9	2.54	1.47	3.36	(1.53, 6.38)
Champ.Valley Phys Hosp	103	1	0.97	1.21	1.57	(0.02, 8.72)
Ellis Hospital	267	1	0.37	1.67	0.44	(0.01, 2.43)
Erie County Med Ctr	158	3	1.90	1.90	1.95	(0.39, 5.68)
Good Sam - Suffern	178	2	1.12	1.73	1.27	(0.14, 4.58)
Lenox Hill Hospital	472	11	2.33	1.90	2.39	(1.19, 4.28)
Long Island Jewish	290	4	1.38	2.28	1.18	(0.32, 3.02)
M I Bassett Hospital	68	0	0.00	1.21	0.00	(0.00, 8.71)
Maimonides Medical Ctr	354	8	2.26	2.01	2.19	(0.94, 4.31)
Mercy Hospital	289	7	2.42	1.94	2.44	(0.98, 5.02)
Millard Fillmore Hosp	334	8	2.40	1.78	2.63	(1.13, 5.18)
Montefiore - Moses	280	7	2.50	1.81	2.68	(1.08, 5.53)
Montefiore - Weiler	148	7	4.73	1.78	5.19 *	(2.08,10.69)
Mount Sinai Hospital	228	8	3.51	1.89	3.61	(1.55, 7.12)
NY Hospital - Queens	107	6	5.61	1.47	7.43 *	(2.71,16.18)
NY Methodist Hospital	124	3	2.42	1.93	2.44	(0.49, 7.14)
NYP- Columbia Presby.	370	10	2.70	1.91	2.76	(1.32, 5.08)
NYP- Weill Cornell	356	7	1.97	2.30	1.67	(0.67, 3.43)
NYU Hospitals Center	107	2	1.87	1.44	2.53	(0.28, 9.14)
North Shore Univ Hosp	596	8	1.34	2.33	1.12	(0.48, 2.21)
Rochester General Hosp	476	11	2.31	2.34	1.93	(0.96, 3.45)
SVCMC- St. Vincents	142	5	3.52	1.52	4.50	(1.45,10.51)
St. Elizabeth Med Ctr	239	8	3.35	2.23	2.92	(1.26, 5.75)
St. Francis Hospital	886	17	1.92	1.95	1.92	(1.12, 3.07)
St. Josephs Hospital	570	15	2.63	2.26	2.27	(1.27, 3.75)
St. Lukes at St. Lukes	164	3	1.83	2.64	1.35	(0.27, 3.95)
St. Peters Hospital	402	1	0.25	1.65	0.29 **	(0.00, 1.64)
Staten Island Univ Hosp	387	8	2.07	2.18	1.85	(0.79, 3.64)
Strong Memorial Hosp	334	11	3.29	1.96	3.27	(1.63, 5.84)
United Hlth Svcs-Wilson	217	4	1.84	1.99	1.81	(0.49, 4.63)
Univ.Hosp-Brooklyn	73	2	2.74	2.86	1.86	(0.21, 6.73)
Univ.Hosp-SUNY Upstate	187	1	0.53	2.08	0.50	(0.01, 2.78)
Univ.Hosp-Stony Brook	306	4	1.31	1.80	1.42	(0.38, 3.63)
Vassar Bros. Med Ctr	238	2	0.84	2.20	0.74	(0.08, 2.69)
Westchester Med Ctr	493	4	0.81	2.00	0.79	(0.21, 2.02)
Winthrop Univ. Hosp	311	3	0.96	1.91	0.98	(0.20, 2.87)
Statewide Total	11445	223	1.95	1.95	1.95	

* RAMR significantly higher than statewide rate based on 95 percent confidence interval.

** RAMR significantly lower than statewide rate based on 95 percent confidence interval.

Figure 7. New York Cardiac Surgery Reporting System – tabular display

Sample screens from reporting initiatives

Nursing Home Name and General Information ▲ Click here to sort by Nursing Home Name	Overall Rating [What is this?]	Health Inspections [What is this?]	Nursing Home Staffing [What is this?]	Quality Measures [What is this?]	Program Participation	Number of Certified Beds [What is this?]	Type of Ownership
ALICE MANOR NURSING HOME 2045 ROCKROSE AVENUE BALTIMORE, MD 21211 (410) 889-9700 Resident & Family Councils Map and Directions	★★★ 3 out of 5 stars	★★★ 3 out of 5 stars	★★ 2 out of 5 stars	★★★ 3 out of 5 stars	Medicare and Medicaid	105	For profit - Corporation
ABINGTON WEST NURSING & REHAB CENTER¹ 3929 FENHUKST AVENUE BALTIMORE, MD 21215 (410) 664-9925 Resident & Family Councils Map and Directions	★★★ 3 out of 5 stars	★★★ 3 out of 5 stars	★★★ 3 out of 5 stars	★★★ 3 out of 5 stars	Medicare and Medicaid	80	For profit - Corporation
AUGSBURG LUTHERAN HOME¹ 6011 CAMPFIELD ROAD BALTIMORE, MD 21207 (410) 406-4573 Resident Council Continuing Care Retirement Community Map and Directions	★★★★★ 4 out of 5 stars	★★★★★ 4 out of 5 stars	★★★ 3 out of 5 stars	★★★★★ 4 out of 5 stars	Medicare and Medicaid	123	Non profit - Church related
BLUE POINT NURSING CENTER 2923 WEST BELVEDERE BALTIMORE, MD 21215 (410) 367-9100 Resident & Family Councils Map and Directions	★ 1 out of 5 stars	★★ 2 out of 5 stars	★ 1 out of 5 stars	★★★★★ 4 out of 5 stars	Medicare and Medicaid	135	For profit - Partnership
CATON MANOR 3230 WILKENS AVENUE BALTIMORE, MD 21229 (410) 520-1544 Resident & Family Councils Map and Directions	★★★ 3 out of 5 stars	★★ 2 out of 5 stars	★★★★★ 4 out of 5 stars	★★★★★ 4 out of 5 stars	Medicare and Medicaid	168	For profit - Corporation
COURTLAND GARDENS NURSING & REHAB CENTER 7920 SCOTT'S LEVEL ROAD BALTIMORE, MD 21208 (410) 521-3600 Resident & Family Councils Map and Directions	★★★ 3 out of 5 stars	★★★ 3 out of 5 stars	★★★ 3 out of 5 stars	★★ 2 out of 5 stars	Medicare and Medicaid	145	For profit - Corporation
CRAWFORD RETREAT² 2117 DENISON STREET BALTIMORE, MD 21216 (410) 566-0160 Map and Directions	★★★★★ 5 out of 5 stars	★★★★★ 5 out of 5 stars	★★★★★ 4 out of 5 stars	★★★★★ 5 out of 5 stars	Medicaid	20	For profit - Corporation

Figure 8. Nursing Home Compare

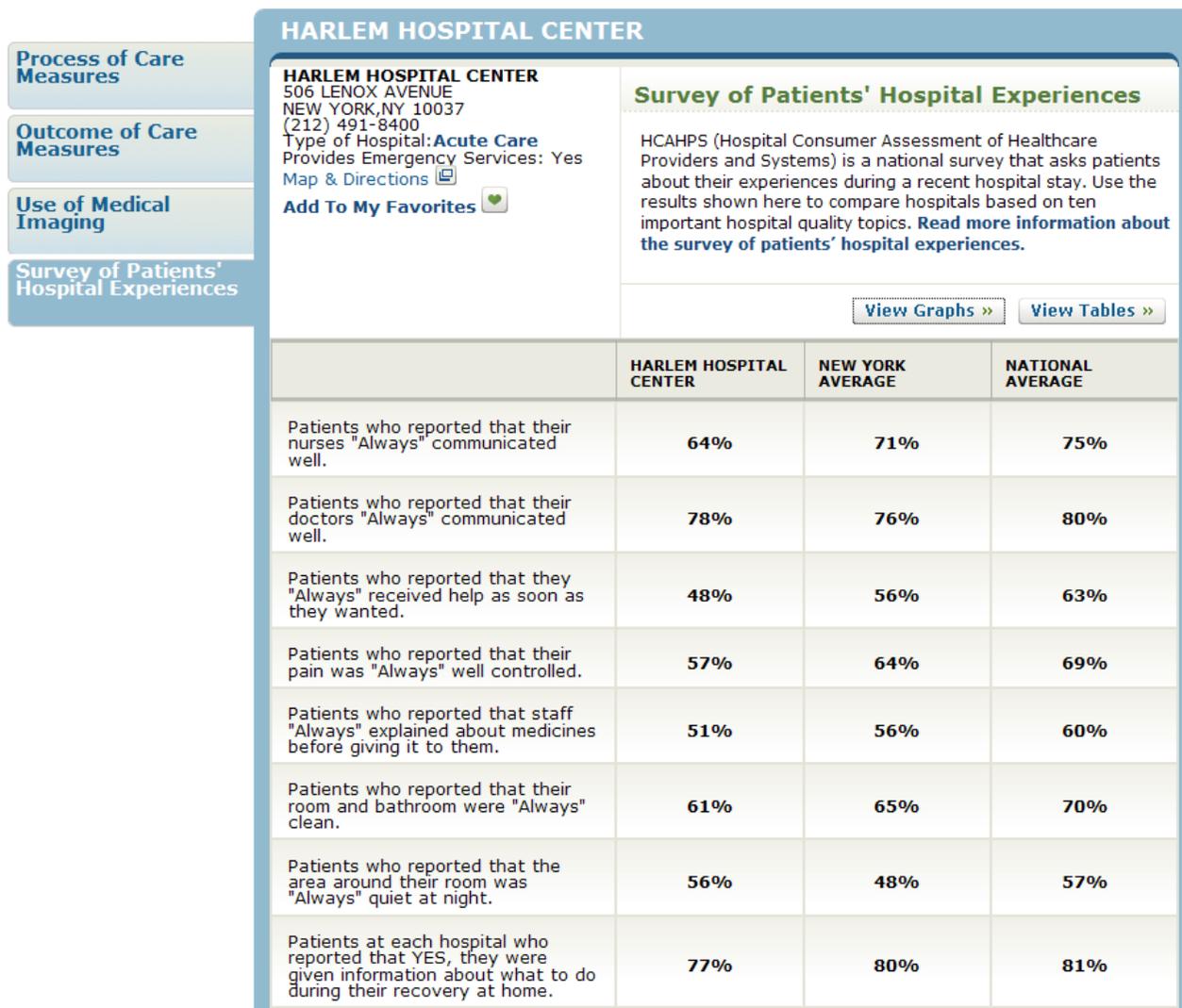


Figure 2. Hospital Compare – Results of survey of patients’ experiences example

Appendix E: NHS performance ratings by trust - sorted alphabetically

Trust name	Trust type	Strategic health authority area	Two parts of overall rating		2007/08 rating		2008/07 rating		2006/06 rating	
			Overall quality score	Financial management score	Quality score	Finance score	Quality score	Finance score	Quality score	Finance score
1 Together NHS Foundation Trust	Mental health trust	South West	Excellent	Excellent	Good	Excellent	Excellent	Fair	Fair	Weak
2 5 Boroughs Partnership NHS Trust	Mental health trust	North West	Excellent	Good	Excellent	Fair	Fair	Fair	Fair	Fair
3 Alfreed University Hospitals NHS Foundation Trust	Acute and specialist	North West	Good	Excellent	Fair	Excellent	Good	Excellent	Fair	Good
4 Alredale NHS Trust	Acute and specialist	Yorkshire and The Humber	Excellent	Good	Good	Good	Fair	Fair	Good	Weak
5 Alder Hey Children's NHS Foundation Trust	Acute and specialist	North West	Excellent	Excellent	Excellent	Good	Excellent	Good	Excellent	Fair
6 Ashford and St Peter's Hospitals NHS Trust	Acute and specialist	South East Coast	Good	Good	Good	Fair	Fair	Weak	Good	Weak
7 Ashton, Leigh and Wigan Primary Care Trust	Primary care trust	North West	Good	Good	Fair	Excellent	Fair	Excellent	Good	Good
8 Avon and Wiltshire Mental Health Partnership NHS Trust	Mental health trust	South West	Fair	Good	Good	Fair	Fair	Weak	Fair	Weak
9 Barking and Dagenham Primary Care Trust	Primary care trust	London	Weak	Fair	Fair	Good	Fair	Excellent	Fair	Fair
10 Barking, Havering and Redbridge Hospitals NHS Trust	Acute and specialist	London	Weak	Weak	Fair	Weak	Fair	Weak	Fair	Weak
11 Barnet and Chase Farm Hospitals NHS Trust	Acute and specialist	London	Good	Good	Good	Fair	Good	Weak	Weak	Weak
12 Barnet Primary Care Trust	Primary care trust	London	Good	Good	Fair	Fair	Good	Fair	Weak	Fair
13 Barnet, Enfield and Haringey Mental Health NHS Trust	Mental health trust	London	Excellent	Good	Excellent	Good	Good	Fair	Fair	Weak
14 Bamsley Hospital NHS Foundation Trust	Acute and specialist	Yorkshire and The Humber	Good	Excellent	Excellent	Good	Good	Excellent	Good	Good
15 Bamsley Primary Care Trust	Primary care trust	Yorkshire and The Humber	Good	Good	Excellent	Good	Good	Good	Fair	Fair
16 Barts and The London NHS Trust	Acute and specialist	London	Weak	Fair	Fair	Good	Excellent	Good	Excellent	Good
17 Basildon and Thurrock University Hospitals NHS Foundation Trust	Acute and specialist	East of England	Good	Excellent	Excellent	Excellent	Fair	Excellent	Good	Excellent
18 Basingstoke and North Hampshire NHS Foundation Trust	Acute and specialist	South Central	Good	Excellent	Excellent	Excellent	Excellent	Excellent	Fair	Fair
19 Bassetlaw Primary Care Trust	Primary care trust	East Midlands	Good	Fair	Fair	Fair	Good	Fair	Good	Fair
20 Bath and North East Somerset Primary Care Trust	Primary care trust	South West	Good	Good	Fair	Good	Weak	Good	Fair	Good
21 Bedford Hospital NHS Trust	Acute and specialist	East of England	Good	Fair	Weak	Fair	Fair	Fair	Fair	Weak
22 Bedfordshire and Luton Mental Health and Social Care Partnership NHS Trust	Mental health trust	East of England	Fair	Fair	Good	Good	Good	Fair	Fair	Fair
23 Bedfordshire Primary Care Trust	Primary care trust	East of England	Fair	Fair	Fair	Fair	Fair	Weak	-	-
24 Berkshire East Primary Care Trust	Primary care trust	South Central	Good	Good	Fair	Fair	Fair	Fair	-	-

Figure 3. NHS 'Annual health check'

Sample screens from reporting initiatives

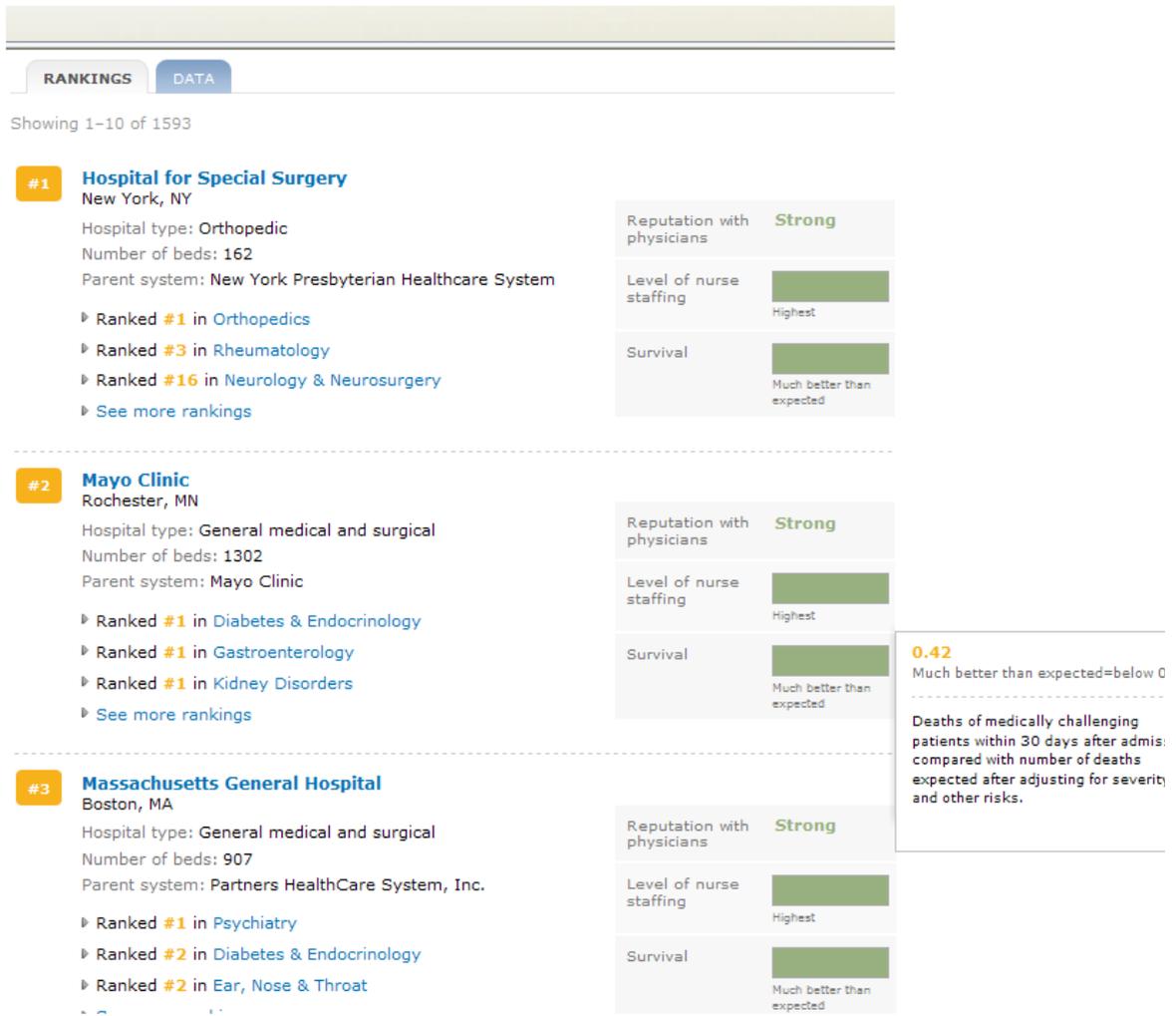


Figure 4. US News and World report hospital rankings

Appendix 8: Web-based reporting systems

Country	Website	URL	Description
AUSTRALIA	1. Your Hospitals	http://www.health.vic.gov.au/yourhospitals	Initiative of the Consumer Participation and Information Program. The aim is to provide information to patients, caregivers, and health care professionals. The information is generated by the Department of Health, its funded agencies, and special interest groups
CANADA	2. Hospital Report	http://www.hospitalreport.ca	Initiative of the HHRC (Hospital Report Research Collaborative). The aims are to increase public accountability and to improve quality of care
DENMARK	3. Sundhed	http://www.sundhed.dk	Initiative of the Danish Ministry of Health. The reporting system 'Sundhedkvalitet' is managed by the National Board of Health. The aim is to support consumers in their health care choices
GERMANY	4. Weisse Liste	http://www.weisse-liste.de	Initiative of the Bertelsmann Stiftung in collaboration with patient associations and scientific partners. The aims are to empower consumers and to support them in their health care choices
	5. Klinik Führer Rhein-Ruhr	http://www.kliniken-rhein-ruhr.de	Initiative of the Initiativkreis Ruhrgebiet Verwaltungs-GmbH (a collaborative of hospitals) in collaboration with scientific partners. The aim is to support consumers in their health care choices. The information is generated from the hospitals and from patient surveys
	6. Klinikführer Rheinland	http://www.klinikfuehrer-rheinland.de	Initiative of the Krankenhauszweckverband Köln, Bonn, und Region (KHVZ) (a collaborative of hospitals). The aim is to support consumers in their health care choices. The information is generated from the hospitals by the KHVZ
	7. Hamburger Krankenhaus-spiegel	http://www.hamburger-krankenhausspiegel.de	Initiative of 25 hospitals in collaboration with other partners. The aim is to support consumers in their health care choices, and to stimulate providers' quality improvement initiatives. The information is generated from the hospitals by independent audit parties
	8. Klinikbewertungen	http://www.klinikbewertungen.de	Initiative of MedizInfo, which is an Internet portal about health and health care. The aim is to provide an independent online forum about consumers' experiences in order to help consumers in their health care choices. A second aim is to stimulate providers' quality improvement initiatives. The information is generated from consumers' reports on the forum
IRELAND	9. Health Information and Quality Authority	http://www.hiqa.ie	Initiative of the Health Information and Quality Authority (part of the government's health reform program). The aims are to monitor quality of care on a set of standards and to stimulate improvement initiatives. A third aim is to help consumers in their health care choices
THE NETHERLANDS	10. kiesBete	http://www.kiesBeter.nl	Initiative of the Ministry of Health and managed by the National Institute for Public Health and the Environment (RIVM) in collaboration with patient associations, health care providers, and scientific partners. The aim is to provide an independent portal for all questions from the public about health and health care. One particular aim is to support consumers in their health care choices

Country	Website	URL	Description
	11. Independer Gezondheids-zorg	http://www.independer.nl	Initiative of Independer.nl in collaboration with other parties. The aim is to increase transparency and to support consumers in their health care choices. The information is generated by the external parties, Mediquest and Zorgweb
	12. Zorgkiezer	http://www.zorgkiezer.nl	Initiative of DGN Publishers (Internet company) in collaboration with health care providers and health insurance companies. The aim is to help consumers and health care professionals in their choices. The information is generated by the website editors
	13. Zorgbelang	http://www.zorgbelang-nederland.nl	Initiative of Zorgbelang Nederland (association of local organizations advocating health care consumers' interests) in collaboration with patient associations and other parties. The aim is to provide the public with information about health care
	14. Agis Zorggids	http://www.agisweb.nl	Initiative of health insurer Agis. The aim is to inform the insured about their options in health care (concerning contracted providers) and to provide public accountability for the activities of Agis. The information is generated by external parties
	15. Menzis behandelwijzer	http://www.menzis.nl	Initiative of health insurer Menzis. The aim is to support the insured in their health care choices (concerning contracted providers). The information is generated by the health purchase department and by external parties
	16. VGZ Zorggids -Vergelijk en kies	http://www.vgz.nl	Initiative of health insurer VGZ. The aim is to support the insured in their health care choices (concerning contracted providers). The information is generated by external parties
	17. CZ Ziekenhuisver-gelijker	http://www.cz.nl	Initiative of health insurer CZ. The aim is to support the insured in their health care choices (concerning contracted providers). The information is generated by external parties
	18. AD Ziekenhuisver-gelijker	http://www.ad.nl/ziekenhuistop100	Initiative of the daily paper Algemeen Dagblad (AD), in collaboration with health care professionals and medical associations. The aim is to inform the public about hospital performances. The information is generated by the paper: hospitals are asked to provide the information
	19. Elsevier Beste Ziekenhuizen	http://www.elsevier.nl/artimg/200709/besteziekenhuizen.pdf	Initiative of the weekly magazine, Elsevier, in collaboration with health care professionals, managers, and researchers. The aim is to inform the public about hospital performance concerning current questions in health care
	20. Vaatpatient	http://www.vaatpatient.nl	Initiative of the Vereniging van Vaatpatienten (VVVP) (vascular disease patient association). The aim is to support patients in their health care choices. The information is generated by external parties. The VVVP provides quality marks based on the information
NORWAY	21. Fritt Sykehusvalg Norge	http://www.frittsykehusvalg.no	Initiative of the Norwegian Ministry of Health in collaboration with patient advisors. The aim is to empower consumers and to support consumers and health care professionals in their choices. In addition, the aim is to stimulate competition and quality improvement

Web-based reporting systems

Country	Website	URL	Description
UNITED KINGDOM	22. Dr. Foster	http://www.drfooster.co.uk	Private initiative in collaboration with the Information Centre for Health and Social Care, health service organizations, and local authorities. The aims are to inform consumers and health care professionals about the options in health care, and to support consumers in their health care choices. In addition, the aim is to stimulate quality improvement initiatives. The information is generated from a number of external sources
	23. NHS choices	http://www.nhsdirect.nhs.uk	Initiative of the NHS (National Health Services), in collaboration with the National Library for Health, the Information Centre for Health and Social Care, the Health care Commission and other parties. The aim is to support consumers in their decisions about health and health care
	24. Human Fertilisation and Embryology Authority, clinics guide	http://www.hfea.gov.uk	Initiative of the Human Fertilisation and Embryology Authority (HFEA). The aims are to inform consumers about the options in health care and to support them in their health care choices. The information is generated by the HFEA and provided by the clinics
	25. British Association of Aesthetic Plastic Surgeons	http://www.baaps.org.uk	Initiative of the British Association of Aesthetic Plastic Surgeons. The aims are to inform the public about the practice and quality of plastic surgery and to support consumers in their health care choices
	26. Private Health care UK	http://www.privatehealth.co.uk	Initiative of Intuition Communication Ltd (a commercial organization). The aims are to inform consumers about options in private health care and to support them in their health care choices
UNITED STATES	27. Hospital Compare	http://www.hospitalcompare.hhs.gov	Initiative of the US Department of Health and Human Services (HHS). Hospital Compare is a collaboration of the Centers for Medicare and Medicaid Services (CMS), the Department of Health and Human Services, and members of the Hospital Quality Alliance (HQA). The aim is to support consumers in their health care choices. The information is provided by the health care providers
	28. The Leapfrog Group	http://www.leapfroggroup.org	Initiative of the Leapfrog Group (a collaboration of employers). The aim is to stimulate transparency and access to information in order to support health purchasers and consumers in their choices. In addition, the aim is to stimulate quality improvement initiatives. The information is provided by the health care providers
	29. The Patient Advocate	http://www.opa.ca.gov/report_card	Initiative of the Office of the Patient Advocate (OPA) in collaboration with the Department of Managed Health Care. The aim is to inform health care consumers about their rights and about the options in health care (patient empowerment). In addition, aims are to stimulate health care transparency and to support health care purchasers and consumers in their choices. The information is generated from a number of external sources
	30. Nursing Home Compare	http://www.medicare.gov/NHcompare	Initiative of Medicare. The aims are to inform the public about nursing home options in Medicare and to support consumers in their choices. The information is generated by external parties and/or provided by the nursing homes
	31. Home Health care Compare	http://www.medicare.gov/HHcompare	Initiative of Medicare. The aims are to inform the public about home health care options in Medicare and to support consumers in their choices. The information is generated by external parties and/or provided by the home health care providers

Country	Website	URL	Description
	32. Dialysis Facility Compare	http://www.medicare.gov/dialysis	Initiative of Medicare. The aims are to inform the public about chronic kidney disease and dialysis, about dialysis facility options in Medicare, and to support consumers in their choices. The information is generated by external parties and/or provided by the facilities
	33. Medicare Options Compare	http://www.medicare.gov/MPPF	Initiative of Medicare. The aims are to inform the public about health plans options in Medicare and to support consumers in their choices. The information is generated by external parties and / or provided by the plans
	34. U Compare Health care	http://www.ucomparehealthcare.com	Initiative of About, Inc (part of the New York Times Company). The aim is to support consumers in their health care choices. The information is generated from a number of external federal sources
	35. California Nursing Home Search	http://www.calnhs.org	Initiative of the California Health care Foundation in collaboration with the Department of Social and Behavioral Sciences of the University of California. The aim is to inform the public about the options in health care. The information is generated from a number of external state and federal sources
	36. NCOA	http://www.ncqa.org	Initiative of the National Committee for Quality Assurance (NCQA). The aim is to stimulate transparency and quality improvement initiatives. In addition, the aim is to support consumers in their health care decisions. The information (based on a set of standardized measures) is generated by the NCQA
	37. US News Health	http://health.usnews.com/sections/health	Initiative of the US News magazine (which also includes a weekly digital magazine). The aim is to inform the public about performance of hospitals (America's best hospitals) and about health plans (America's best health plans). The information is generated by the magazine's editors
	38. AHD.com	http://www.ahd.com	Initiative of the American Hospital Directory, Inc. (a private company). The aim is to inform subscribers about performances of hospitals. The information is generated by the company and extracted from a number of external sources
	39. Health Care Choices	http://www.healthcarechoices.com	Initiative of Health Care Choices (HCC) which is a not-for-profit corporation. The aims are to inform the public about the health care system and to support health care purchasers and consumers in their choices
	40. Quality Check	http://www.qualitycheck.org	Initiative of the Joint Commission on Accreditation of Health care Organizations (JCAHO), which is a non-for-profit organization. The aim is to support consumers in their health care choices. The information is provided by the health care providers to the Joint Commission
	41. PHC4	http://www.phc4.org	Initiative of the Pennsylvania's Health Care Cost Containment Council. The aim is to increase transparency and competition between health care providers. The information is generated from hospitals and health plans by the Council
SWEDEN	42. Aldre-guiden	http://www.socialstyrelsen.se/alldreguiden	Initiative of Socialstyrelsen (a governmental organization of the Ministry of Health). The aims are to inform consumers about the options in elderly care and to support their choices. In addition, the aim is to stimulate quality improvement initiatives. The information is provided by local authorities

Source: Damman et al. 2010

References

- Baker DW, Einstadter D, Thomas C, HUSK S, Gordon NH, Cebul RD. The effect of publicly reporting hospital performance on market share and risk-adjusted mortality at high-mortality hospitals. *Medical Care* 2003; 41(6):729–740.
- Baker DW, Einstadter D, Thomas CL, HUSK SS, Gordon NH, Cebul RD. Mortality trends during a program that publicly reported hospital performance. *Medical Care* 2002; 40(10):879–890.
- Beaulieu ND. Quality information and consumer health plan choices. *Journal of Health Economics* 2002; 21(1):43–63.
- Bentley JM, Nash DB. How Pennsylvania hospitals have responded to publicly released reports on coronary artery bypass graft surgery. *The Joint Commission journal on quality improvement* 1998; 24(1):40–49.
- Berwick DM, James B, Coye MJ. Connections between quality measurement and improvement. *Medical Care* 2003; 41(1)(suppl)
- Berwick DM, Wald DL. Hospital leaders' opinions of the HCFA mortality data. *Journal of the American Medical Association* 1990; 263(2):247–249.
- Booske BC, Sainfort F, Hundt AS. Eliciting consumer preferences for health plans. *Health Serv Res* 1999; 34(4):839–854.
- Bost JE. Managed care organizations publicly reporting three years of HEDIS measures. *Managed care interface* 2001; 14(9):50–54.
- Brien SE, Lorenzetti DL, Lewis S, Kennedy J, Ghali WA. Overview of a formal scoping review on health system report cards. *Implementation Science* 2010; 5(1).
- Bundorf MK, Chun N, Goda GS, Kessler DP. Do markets respond to quality information? The case of fertility clinics. *Journal of Health Economics* 2009; 28(3):718–727.
- Burack JH, Impellizzeri P, Homel P, Cunningham Jr JN. Public reporting of surgical mortality: a survey of New York state cardiothoracic surgeons. *Annals of Thoracic Surgery* 1999; 68(4):1195–1202.
- Castle NG. Consumers' use of internet-based nursing home report cards. *Jt Comm J Qual Patient Saf* 2009a; 35(6):316–323.
- Castle NG. The Nursing Home Compare report card: consumers' use and understanding. *J Aging Soc Policy* 2009b; 21(2):187–208.
- Chassin MR. Achieving and sustaining improved quality: Lessons from New York state and cardiac surgery. *Health Affairs* 2002; 21(4):40--51.
- Chen JC. Public reporting of health system performance: review of evidence on impact on patients, providers and health care organisations: an Evidence Check rapid review brokered by the Sax Institute (<http://www.saxinstitute.org.au>) for the Bureau of Health Information. Sydney: Sax Institute 2010.
- Chernew M, Gowrisankaran G, Scanlon DP. Learning and the value of information: evidence from health plan report cards. *Journal of Econometrics* 2008; 144(1):156–174.
- Chernew M, Scanlon DP. Health plan report cards and insurance choice. *Inquiry* 1998; 35(1):922.
- Clough JD, Engler D, Snow R, Canuto PE. Lack of relationship between the Cleveland Health Quality Choice project and decreased inpatient mortality in Cleveland. *American Journal of Medical Quality* 2002; 17(2):47–55.
- Cochrane Effective Practice and Organisation of Care Review Group. The data collection checklist. Ottawa: Cochrane Effective Practice and Organisation of Care Review Group 2002.
- Council of Australian Governments. National Health and Hospitals Network Agreement. Canberra: COAG 2010. Available from http://www.gpv.org.au/files/downloadable_files/Resources/e-Bulletin%20Resources/20100423_sum_COAG%20agreement.pdf

- Dafny L, Dranove D. Do report cards tell consumers anything they don't already know? The case of Medicare HMOs. *RAND Journal of Economics* 2008; 39(3):790–821.
- Damman OC, van den Hengel YK, van Loon AJ, Rademakers J. An international comparison of web-based reporting about health care quality: content analysis', *J Med Internet Res* 2010; 12(2):e8.
- Drake DE, Cohen A, Cohn J. National hospital antibiotic timing measures for pneumonia and antibiotic overuse. *Quality Management in Health Care* 2007; 16(2):113–22.
- Dranove D, Kessler D, McClellan M, Satterthwaite M. Is more information better? The effects of "Report Cards" on health care providers'. *Journal of Political Economy* 2003; 111(3):555–588.
- Dranove D, Sfekas A. Start spreading the news: A structural estimate of the effects of New York hospital report cards. *Journal of Health Economics* 2008; 27(5):1201–1207.
- Duvalko KM, Sherar M, Sawka C. Creating a system for performance improvement in cancer care: Cancer Care Ontario's clinical governance framework. *Cancer Control* 2009; 16(4):293–302.
- Dziuban Jr SW, McIlduff JB, Miller SJ, Dal Col RH. How a New York cardiac surgery program uses outcomes data. *Annals of Thoracic Surgery* 1994; 58(6):1871–1876.
- Epstein AJ. Effects of report cards on referral patterns to cardiac surgeons. *J Health Econ* 2010; 29(5):718–731.
- Farley DO, Elliott MN, Short PF, Damiano P, Kanouse, DE, Hays RD. Effect of CAHPS performance information on health plan choices by Iowa Medicaid beneficiaries. *Medical Care Research and Review* 2002; 59(3):319–336.
- Farley DO, Short PF, Elliott MN, Kanouse, DE, Brown, JA, Hays RD. Effects of CAHPS health plan performance information on plan choices by New Jersey Medicaid beneficiaries. *Health Services Research* 2002; 37(4):985–1007.
- Friedberg, MW, Mehrotra A, Linder JA. Reporting hospitals' antibiotic timing in pneumonia: adverse consequences for patients?' *American Journal of Managed Care* 2009; 15(2):137–144.
- Fung CH, Lim YW, Mattke S, Damberg C, Shekelle PG. Systematic review: the evidence that publishing patient care performance data improves quality of care. *Annals of Internal Medicine* 2008; 148(2):111–23.
- Gabel J, Hunt K, Hurst K. When employers choose health plans. New York: Commonwealth Fund 1998.
- Ghali WA, Ash AS, Hall RE, Moskowitz MA. Statewide quality improvement initiatives and mortality after cardiac surgery. *Journal of the American Medical Association* 1997; 277(5):379–382.
- Gibbs DA, Sangl JA, Burrus B. Consumer perspectives on information needs for health plan choice. *Health Care Financ Rev* 1996; 18(1):55–73.
- GRADE Working Group. Grading of recommendations, assessment, development, and evaluation 2007.
- Grimshaw J, McAuley LM, Bero LA, Grilli R, Oxman AD, Ramsay C et al. Systematic reviews of the effectiveness of quality improvement strategies and programmes. *Quality and Safety in Health Care* 2003; 12(4):298–303.
- Guru V, Fremes SE, Naylor CD, Austin PC, Shrive FM et al. Public versus private institutional performance reporting: what is mandatory for quality improvement? *American Heart Journal* 2006; 152(3):573–578.
- Hannan EL, Kilburn Jr H, Racz M, Shields E, Chassin MR. Improving the outcomes of coronary artery bypass surgery in New York State. *Journal of the American Medical Association* 1994; 271(10):761–766.
- Hannan EL, Kumar D, Racz M, Siu A, Chassin MR. New York State's cardiac surgery reporting system: four years later. *Annals of Thoracic Surgery* 1994; 58(6):1852–1857.

- Hannan EL, Siu AL, Kumar D, Kilburn Jr H, Chassin MR. The decline in coronary artery bypass graft surgery mortality in New York State: the role of surgeon volume. *Journal of the American Medical Association*. 1995; 273(3):209–213.
- Hannan EL, Stone CC, Biddie TL, DeBuono BA. Public release of cardiac surgery outcomes data in New York: what do New York State cardiologists think of it? *American Heart Journal* 1997; 134(1):55–61.
- Harris KM. Can high quality overcome consumer resistance to restricted provider access? Evidence from a health plan choice experiment. *Health Services Research* 2002; 37(3):551–571.
- Hibbard JH, Jewett JJ. What type of quality information do consumers want in a health care report card? *Med Care Res Rev* 1996; 53(1):28–47.
- Hibbard JH, Jewett JJ. Will quality report cards help consumers? *Health Aff (Millwood)* 1997; 16(3):218–228.
- Hibbard JH, Jewett JJ, Engelmann S, Tusler M. Can Medicare beneficiaries make informed choices? *Health Affairs* 1998; 17(6):181–193.
- Hibbard JH, Jewett JJ, Legnini MW, Tusler M. Choosing a health plan: do large employers use the data? *Health Affairs* 1997; 16(6):172–180.
- Hibbard JH, Stockard J, Tusler M. Does publicizing hospital performance stimulate quality improvement efforts? *Health Affairs* 2003; 22(2):84–94.
- Hibbard JH, Stockard J, Tusler M. Hospital performance reports: impact on quality, market share, and reputation. *Health Affairs* 2005; 24(4):1150–1160.
- Hibbard JH, Weeks EC. Does the dissemination of comparative data on physician fees affect consumer use of services? *Medical Care* 1989; 27(12):1167–1174.
- Hollenbeak CS, Gorton CP, Tabak YP, Jones JL, Milstein A, Johannes RS. Reductions in mortality associated with intensive public reporting of hospital outcomes. *American Journal of Medical Quality* 2008; 23(4):279–286.
- Hussey PS, de Vries H, Romley J, Wang MC, Chen SS, Shekelle et al. A systematic review of health care efficiency measures. *Health Serv Res* 2009; 44(3):784–805.
- Isaacs SL. Consumer's information needs: results of a national survey. *Health Aff (Millwood)* 1996; 15(4):31–41.
- Jewett JJ, Hibbard JH. Comprehension of quality of care indicators: differences among privately insured, publicly insured, and uninsured. *Health Care Financing Review* 1996; 18(1):75–94.
- Jha AK, Epstein AM. The predictive accuracy of the New York State coronary artery bypass surgery report-card system. *Health Affairs* 2006; 25(3): 844–855.
- Jha AK, Orav EJ, Epstein AM. Public reporting of discharge planning and rates of readmissions. *New England Journal of Medicine* 2009; 361(27): 2637–2645.
- Jin GZ, Sorensen AT. Information and consumer choice: the value of publicized health plan ratings. *Journal of Health Economics* 2006; 25(2):248–275.
- Khan OA, Iyengar S, Pontefract DE, Rogers V, Ohri SK, Livesey SA. Impact of surgeon-specific data reporting on surgical training. *Ann R Coll Surg Engl* 2007; 89(8):796–798.
- Knutson DJ, Kind EA, Fowles JB, Adlis S. Impact of report cards on employees: a natural experiment. *Health Care Financ Rev* 1998; 20(1):5–27.
- Kritchevsky SB, Braun BI, Bush AJ, Bozikis MR, Kusek L, Burke JP et al. The effect of a quality improvement collaborative to improve antimicrobial prophylaxis in surgical patients a randomized trial. *Annals of Internal Medicine* 2008; 149(7):472–480.
- Landon BE, Rosenthal MB, Normand SLT, Frank RG, Epstein AM. Quality monitoring and management in commercial health plans. *American Journal of Managed Care* 2008; 14(6):377–386.

- Levy G, Goldstein L, Barenboim E, Bar-Dayyan Y. Effect of a computerized online grading system on patient satisfaction in a military primary health care setting. *Mil Med* 2007; 172(4):431–435.
- Li Z, Carlisle DM, Marcin JP, Castellanos LR, Romano PS et al. Impact of public reporting on access to coronary artery bypass surgery: the California Outcomes Reporting Program. *Annals of Thoracic Surgery* 2010; 89(4):1131–1138.
- Lindenauer PK, Remus D, Roman S, Rothberg MB, Benjamin EM et al. Public reporting and pay for performance in hospital quality improvement. *New England Journal of Medicine* 2007; 356(5):486–496.
- Longo DR, Land G, Schramm W, Fraas J, Hoskins B, Howell V. Consumer reports in health care: do they make a difference in patient care? *Journal of the American Medical Association* 1997; 278(19):1579–1584.
- Luce JM, Thiel GD, Holland MR, Swig L, Currin SA, Luft HS. Use of risk-adjusted outcome data for quality improvement by public hospitals. *Western Journal of Medicine* 1996; 164(5):410–414.
- Mannion R, Davies H, Marshall M. Impact of star performance ratings in English acute hospital trusts. *Journal of Health Services Research and Policy* 2005; 10(1):8–24.
- Marshall MN, Shekelle PG, Brook RH, Leatherman S. Public release of information about quality of health care. London: The Nuffield Trust and RAND 2000.
- Marshall MN, Shekelle PG, Leatherman S, Brook RH. The public release of performance data: what do we expect to gain? A review of the evidence. *JAMA* 2000; 283(14):1874.
- Maxwell CI. Public disclosure of performance information in Pennsylvania: impact on hospital charges and the views of hospital executives. *Jt Comm J Qual Improv* 1998; 24(9):491–502.
- Maxwell J, Briscoe F, Davidson S, Eisen L, Robbins M et al. Managed competition in practice: 'value purchasing' by fourteen employers. *Health Aff (Millwood)* 1998; 17(3):216–226.
- Mazor KM, Dodd KS. A qualitative study of consumers' views on public reporting of health care-associated infections. *American Journal of Medical Quality* 2009; 24(5):412–8.
- Mazor KM, Dodd KS, & Kunches L. Communicating hospital infection data to the public: a study of consumer responses and preferences. *American Journal of Medical Quality* 2009; 24(2):108–115.
- McCormick D, Himmelstein DU, Woolhandler S, Wolfe SM, Bor DH. Relationship between low quality-of-care scores and HMOs' subsequent public disclosure of quality-of-care scores. *Journal of the American Medical Association*, 2002; 288(12):1484–1490.
- Mennemeyer ST, Morrisey MA, Howard LZ. Death and reputation: how consumers acted upon HCFA mortality information. *Inquiry* 1997; 34(2):117–128.
- Merle V, Germain JM, Tavolacci MP, Brocard C, Chefson C, Cyvoct C et al. Influence of infection control report cards on patients' choice of hospital: pilot survey. *Journal of Hospital Infection* 2009; 71(3):263–8.
- Moscucci M, Eagle KA, Share D, Smith D, De Franco AC, O'Donnell et al. Public reporting and case selection for percutaneous coronary interventions: an analysis from two large multicenter percutaneous coronary intervention databases. *Journal of the American College of Cardiology* 2005; 45(11):1759–1765.
- Mukamel DB, Lad H, Weimer DL, Spector WD, Zinn JS. Is there evidence of cream skimming among nursing homes following the publication of the nursing home compare report card? *Gerontologist* 2009; 4(6):793–802.
- Mukamel DB, Mushlin AI. Quality of care information makes a difference: an analysis of market share and price changes after publication of the New York State Cardiac Surgery Mortality Reports. *Medical Care* 1998; 36(7):945–954.
- Mukamel DB, Mushlin AI, Weimer D, Zwanziger J, Parker T, Indridason I. Do quality report cards play a role in HMOs' contracting practices? Evidence from New York State. *Health Services Research* 2000; 35(1 II):319–332.

- Mukamel DB, Spector WD, Zinn JS, Huang L, Weimer DL, Dozier A. Nursing homes' response to the nursing home compare report card', *J Gerontol B Psychol Sci Soc Sci* 2007; 62(4):S218–S225.
- Mukamel DB, Weimer DL, Spector WD, Ladd H, Zinn JS. Publication of quality report cards and trends in reported quality measures in nursing homes', *Health Services Research* 2008; 43(4):1244–1262.
- Mukamel DB, Weimer DL, Zwanziger J, Gorthy SFH, Mushlin AI. Quality report cards, selection of cardiac surgeons, and racial disparities: a study of the publication of the New York State Cardiac Surgery Reports. *Inquiry* 2004; 41(4):435–446.
- Mukamel DB, Weimer DL, Zwanziger J, Mushlin AI. Quality of cardiac surgeons and managed care contracting practices. *Health Services Research* 2002; 37(5):1129–1144.
- Narins CR, Dozier AM, Ling FS, Zareba W. The influence of public reporting of outcome data on medical decision making by physicians. *Archives of Internal Medicine* 2005; 165(1):83–87.
- National Committee on Quality Assurance. HEDIS 2011 Summary table of measures, product lines and changes, viewed 15/11/2010. 2011. Available at: <http://www.ncqa.org/Portals/0/HEDISQM/HEDIS%202011/HEDIS%202011%20Measures.pdf>
- Omoigui NA, Miller DP, Brown KJ, Annan K, Cosgrove III D, Lytle B et al. Outmigration for coronary bypass surgery in an era of public dissemination of clinical outcomes. *Circulation* 1996; 93(1):27–33.
- Peters E, Dieckmann N, Dixon A, Hibbard JH, Mertz CK. Less is more in presenting quality information to consumers. *Med Care Res Rev* 2007; 64(2):169–190.
- Peterson ED, DeLong ER, Jollis JG, Muhlbaier LH, Mark DB. The effects of New York's bypass surgery provider profiling on access to care and patient outcomes in the elderly. *Journal of the American College of Cardiology* 1998; 32(4):993–999.
- Pope DG. Reacting to rankings: evidence from 'America's Best Hospitals'. *Journal of Health Economics* 2009; 28(6):1154–1165.
- Rainwater JA, Romano PS, Antonius DM. The California Hospital Outcomes Project: how useful is California's report card for quality improvement? *The Joint Commission journal on quality improvement* 1998; 24(1):31–39.
- Rask KJ, Schuessler LD, Naylor DV. A statewide voluntary patient safety initiative: the Georgia experience. *Jt Comm J Qual Patient Saf* 2006; 32(10):564–572.
- Robinson S, Brodie M. Understanding the quality challenge for health consumers: the Kaiser/AHCPR Survey. *The Joint Commission journal on quality improvement* 1997; 23(5):239–244.
- Romano P, Rainwater J, Antonius D. Grading the graders: how hospitals in California and New York perceive and interpret their report cards. *Medical care* 1999; 37(3):295–305.
- Romano PS, Hong Z. Do well-publicized risk-adjusted outcomes reports affect hospital volume? *Medical Care* 2004; 42(4):367–377.
- Romley JA, Hussey PS, de Vries H, Wang MC, Shekelle PG, McGlynn EA. Efficiency and its measurement: what practitioners need to know. *Am J Manag Care* 2009; 15(11):842–845.
- Rosenthal GE, Hammar PJ, Way LE, Shipley SA, Doner D, Wojtala B et al. Using hospital performance data in quality improvement: the Cleveland Health Quality Choice experience. *The Joint Commission journal on quality improvement* 1998; 24(7):347–360.
- Rosenthal GE, Quinn L, Harper DL. Declines in hospital mortality associated with a regional initiative to measure hospital performance. *American Journal of Medical Quality* 1997; 12(2):103–111.
- Sainfort F, Booske BC. Role of information in consumer selection of health plans. *Health Care Financ Rev* 1996; 18(1):31–54.
- Scanlon DP, Chernew M. HEDIS measures and managed care enrollment. *Med Care Res Rev* 1999; 56(suppl 2):60–84.

- Scanlon DP, Chernew M, McLaughlin C, Solon G. The impact of health plan report cards on managed care enrollment. *Journal of Health Economics* 2002; 21(1):19–41.
- Schauffler HH, Brown C, Milstein A. Raising the bar: the use of performance guarantees by the Pacific Business Group on Health. *Health Aff (Millwood)* 1999; 8(2):134–142.
- Schauffler HH, Mordavsky JK. Consumer reports in health care: do they make a difference? *Annu Rev Public Health* 2001; 22:69–89.
- Schauffler HH, Rodriguez T. Exercising purchasing power for preventive care. *Health Aff (Millwood)* 1996; 15(1):73–85.
- Schneider E, Epstein A. Use of public performance reports: a survey of patients undergoing cardiac surgery. *JAMA* 1998; 279(20):1638–1642.
- Schneider EC, Epstein AM. Influence of cardiac-surgery performance reports on referral practices and access to care: a survey of cardiovascular specialists. *New England Journal of Medicine* 1996; 335(4):251–256.
- Shekelle PG, Lim, YW, Mattke S, Damberg C. Does public release of performance results improve quality of care?: a systematic review: prepared by RAND, Southern California Evidence-based Practice Centre. London: The Health Foundation 2008.
- Sorokin R. Alternative explanations for poor report card performance. *Eff Clin Pract* 2000; 3(1):2530.
- Spranca M, Kanouse DE, Elliott M, Short FP, Farley DO, Hays RD. Do consumer reports of health plan quality affect health plan selection? *Health Services Research* 2000 35(5 1):933–947.
- Stange KC, Zyzanski SJ, Smith TF, Kelly R, Langa DM et al. How valid are medical records and patient questionnaires for physician profiling and health services research? A comparison with direct observation of patients visits. *Med Care* 1998; 36(6):851–867.
- Stevenson DG. Is a public reporting approach appropriate for nursing home care? *J Health Polit Policy Law* 2006; 31(4):773–810.
- Stewart, VT. Use of a prototype acute stroke registry to improve care: profile of receptive stroke programs. *Am J Prev Med* 2006; 31(6)(suppl 2): S217–S223.
- Sullivan HG, Cogbill TH, Fischer GG, Hoppe CM, Lambert PJ, Mathiason MA et al. An institutional approach to maintenance of excellent outcomes for carotid endarterectomy in a setting with moderate-to-low procedure volume. *J Am Coll Surg* 2006; 203(5):634–641.
- Tu HT, Lauer JR. Designing effective health care quality transparency initiatives. *Issue Brief Cent Stud Health Syst Change* 2009; (126):1–6.
- Tu JV, Cameron C. Impact of an acute myocardial infarction report card in Ontario, Canada. *International Journal for Quality in Health Care* 2003; 15(2):131–137.
- Tumlinson A, Bottigheimer H, Mahoney P, Stone EM, Hendricks A. Choosing a health plan: what information will consumers use? *Health Aff (Millwood)* 1997; 16(3):229–238.
- Uhrig JD, Harris-Kojetin L, Bann C, Kuo TM. Do content and format affect older consumers' use of comparative information in a Medicare health plan choice? Results from a controlled experiment. *Med Care Res Rev* 2006; 63(6):701–718.
- US General Accounting Office. *Health Care Reform: 'Report Cards' are useful but significant issues need to be addressed.* Washington: US General Accounting Office 1994.
- Vladeck BC, Goodwin EJ, Myers LP, Sinisi M. Consumers and hospital use: the HCFA 'death list'. *Health Affairs* 1988; 7(1):122–125.
- Wakefield DS, Hendryx MS, Uden-Holman T, Couch R, Helms CM. Comparing providers' performance: problems in making the 'report card' analogy fit. *J Healthc Qual* 1996; 18(6):4–10.
- Wedig GJ, Tai-Seale M. The effect of report cards on consumer choice in the health insurance market. *Journal of Health Economics* 2002; 21(6):1031–1048.
- Werner R, Stuart E, Polsky D. Public reporting drove quality gains at nursing homes. *Health Aff (Millwood)* 2010; 29(9):1706–1713.

- Werner RM, Asch DA, Polsky D. Racial profiling: the unintended consequences of coronary artery bypass graft report cards. *Circulation* 2005; 111(10):1257–1263.
- Werner RM, Konetzka RT, Kruse GB. Impact of public reporting on unreported quality of care. *Health Serv Res* 2009; 44(2 Pt 1):379–398.
- Werner RM, Konetzka RT, Stuart EA, Norton EC, Polsky D, Park, J. Impact of public reporting on quality of postacute care. *Health Serv Res* 2009; 44(4):1169–1187.
- Zinn JS, Spector WD, Weimer DL, Mukamel DB. Strategic orientation and nursing home response to public reporting of quality measures: an application of the miles and snow typology. *Health Services Research* 2008; 43(2):598–615.