

# Evaluating the impact of nursing and midwifery sensitive clinical quality indicators on practice

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## **Summary**

### **Evaluating the impact of nursing and midwifery sensitive clinical quality indicators on practice**

This narrative literature review aimed to examine the literature that identified clinical quality indicators (CQIs) in nursing and midwifery and that also measured the impact of nursing and midwifery practice on CQI implementation and outcome. Specifically, the review objectives were to: (a) examine the evidence that reviewed how quality indicators are being used to influence care delivered by nursing and midwifery practitioners, and (b) from the evidence reviewed, identify the quality indicators that are most readily applied to nursing and midwifery practice in NHS Highland. Nurse and midwifery sensitive CQIs are quantitative measures which reflect professional care standards that monitor and evaluate particular aspects of care for which nurses and midwives have key responsibility. This narrative literature review considered the nurse and midwifery CQIs that have been implemented in NHS Scotland and identified themes from these indicators which reflect the nurse or midwives' distinct professional contribution to CQI outcomes. Additionally, factors have been identified that have been shown to support successful implementation of nurse and midwife sensitive CQIs into clinical practice.

Keywords: clinical quality indicators, nursing metrics, patient safety, nurse or midwifery led indicators

## Abbreviations

American Nurses Association	ANA
Clinical Quality Indicators	CQIs
Keeping Child Birth Natural and Dynamic	KCND
Health care Commission	HCC
National Database of Nursing Quality Indicators	NDNQI
Royal College of Obstetricians and Gynaecologists	RCOG
Royal College of Midwives	RCM
National Health Service	NHS
NHS Institute for Innovation and Improvement	NHS I <sup>2</sup>
National Health Service Quality Improvement Scotland	NHS QIS
National Childbirth Trust	NCT
National Quality Forum	NQF
Transforming Care at the Bedside	TCAB

Within this review the term *patient(s)* is used to refer to both patients and women and their babies.

## **1. Introduction**

The overall aim of this review was to gain an understanding of the effectiveness of the nursing and midwifery contribution to clinical quality indicators. The current and future direction of healthcare delivery is influenced by a range of factors which have merited an assessment of care priorities and systems for delivering care to ensure the best possible outcome for patients. The challenges of delivering cost-effective care also serves to focus attention on the need to maintain high quality care and to evidence that care, including the nursing and midwifery contribution. Furthermore, there is acknowledgement among service providers and service users that at any point of care delivery, patients are at risk of experiencing often preventable, adverse events. An adverse event is defined as “an unintended injury that results in prolonged stay, disability at the time of discharge, or death and is caused by health care management rather than by the patients underlying disease process” (Thomas et al. 2000:262).

The complexities of today’s hospitals make errors a common occurrence. The World Alliance for Patient Safety estimates that 10% of hospital patients in developed countries suffer an adverse event each year (WHO 2004). Others estimate that approximately 1.4 million hospital patients worldwide on any given day experience a hospital acquired infection with one in ten patients suffering harm as an unintended consequence of care in hospital. Additionally, the lack of adherence to guidelines has been blamed for patients receiving inappropriate care (Grol and Grimshaw 2003). As a consequence, it is unsurprising that patient safety has emerged as a key focus in the delivery of health care with an increasing demand for evidence of quality patient care from users of service across primary and secondary healthcare settings. There is also a sustained requirement to demonstrate effective systems of care that support safe and effective care from service providers and to evidence these outcomes. One set of initiatives which are increasingly used to monitor and evaluate quality of care are clinical quality indicators (CQIs). CQIs are broadly measures of care which nurses, midwives and other health care professionals contribute to, and use to assess and promote quality improvement. Clinical indicators were first developed in the US in the late 1980’s (Idvall et al. 1997) and

increasingly have been adopted throughout the world to promote key domains of quality within healthcare. This review will focus on the implementation of nursing and midwifery sensitive CQIs as a measure of quality care delivery.

## **2. Aim**

The aims of this literature review were to identify key themes that (a) examined the evidence that reviewed how quality indicators are being used to influence care delivered by nursing and midwifery practitioners, and (b) from the evidence reviewed, to identify the quality indicators that are most readily applied to nursing and midwifery practice in NHS Highland.

## **3. Method**

With consideration of the aims of this review, and specifically the requirement to produce a synthesis of literature that was both rigorous and meaningful for practice, an interpretive approach to the review was undertaken. An interpretive synthesis of the literature can be carried out on different types of evidence and is concerned with the development of concepts and development of theory rather than aggregations of data (Dixon-Woods et al. 2004). A thematic analysis of the literature involved identification of prominent and recurrent themes in the literature which helped to inform the aims of the review.

### **3.1 Type of Studies / Search Methods**

We aimed to locate research papers that reported on clinical CQIs where there was evidence of nurse and/or midwifery involvement in patient outcomes. The search was conducted in two stages. The first stage entailed a systematic search of the literature and other sources to locate quality indicators which had been subject to validity testing. The keywords used in the search strategy were 'clinical quality indicators', 'quality indicators', 'nurse and/or midwifery metrics' 'nurse led and/or midwifery indicators', 'nurse and/or midwifery sensitive indicators'.

The second stage of the review focused on specific nursing and midwifery CQIs which were most prominently reported in the UK literature sourced in the first search. The specific nursing CQIs searched for were; pressure ulcers, falls, food, fluid and nutrition. The rationale for this focused approach is further explained in the findings section. The original search terms were cross referenced with 'pressure sores', 'pressure ulcers', 'bed sores' 'patient falls', 'falls prevention', 'falls assessment', 'fluids and nutrition'. Search terms for midwifery were, 'midwife led care', 'one-to-one midwifery care in labour' and 'promoting normal birth'.

The following electronic databases were searched: British Nursing Index, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane, EMBASE, Social Policy and Practice, MEDLINE, MIDIRS Willey Interscience. Additionally reference lists of key published papers were hand searched and checked for articles potentially missed by the search. Government and professional body web sites were searched for reports relevant to CQIs.

### **3.2 Inclusion/ Exclusion criteria**

To be included in the review, papers had to report primary research that was published between 2000 and 2010 in the English language. Other materials gathered for the review included policy documents and reports and systematic reviews. If earlier work was deemed relevant this was included.

### **3.3 Search Outcome**

As the search progressed it became apparent that there was a paucity of good quality research studies that evaluated the actual nursing and midwifery contribution to CQIs. The search yielded a number of studies which described data collection approaches which measured various patient outcomes, or reported on the effectiveness of indicators for reducing adverse incidents and improving patient outcomes. While these studies contribute to the growing evidence base that informs both implementation and performance outcomes associated with CQIs, many studies failed to clearly indicate, in particular how the nurse contributed to these outcomes.



The search was subsequently expanded to include international studies that had specific relevance to the CQIs reviewed.

### **3.4 Quality appraisal**

The papers were reviewed by at least two of the review authors and information was completed on, (1) Authors (2) Date (3) Country (4) Study design (5) Interventions (6) Outcome measures (7) Analysis (8) Results and conclusions (9) Key messages. Based on the articles reviewed we identified the seven main themes that were of relevance to the aims (see Appendix 1). Several key themes have consistently emerged from the literature and these form the basis of this review.

## **4. Results**

### **4.1 Development of CQI's**

There is increasing focus within healthcare sectors to ensure that patients do not sustain avoidable harm because of their contact with any part of the healthcare system. Adverse events or clinical incidents are terms normally used to describe an avoidable incident. An adverse event is defined as an 'unintended injury that results in a prolonged stay, disability at the time of discharge, or death and is caused by healthcare management rather than by the patients underlying disease process' (Thomas et al. 2000). Similarly, a clinical incident is any event or circumstance that could have led or did lead to unintended and/or unnecessary mental or physical harm to a person and or complaint, loss or damage or injury whilst in the system (Chaboyer et al. 2010). Some adverse events have been linked to sub-optimal nursing care and are generally considered to be preventable (Van Gaal et al. 2010). Examples of adverse events include; urinary tract infection, falls, pressure sores and medication errors. With reference to midwifery care, adverse events can include the need for hospitalisation in the antenatal period, instrumental delivery and the use of epidural analgesia.

Additionally, the requirement to contain expenditure in healthcare, aligned with the need to deliver cost-effective, evidenced based care means that quality of care requires a form of assessment and evaluation to ensure that it is being delivered. One method of focusing on assessment and improvement in healthcare has been the development of CQIs. Indicators are quantitative measures reflecting a professional care standard which monitors and evaluates the quality of important patient care and support activities (Joint Commission on Care Accreditation of Healthcare Organisation 2007).

Clinical indicators can be described as screening tools which measure three dimensions of quality of care, according to the areas of care being measured. Structure quality includes the measure of structural factors that affect the performance of care (Donabedian 1980), for example staffing levels and skills mix in a ward. Process quality, measures the direct care that staff deliver which include the steps involved when caring for patients that lead to an outcome (Donabedian 1980). Outcome quality is concerned with patient outcomes and the impact for the patient or health care service. Indicators are therefore tools which facilitate the measurement of the quality of care and its outcomes. Mainz (2003) provides a helpful description of quality indicators that summarise their key features,

Quality indicators describe the performance that should occur for a particular type of patient or the related health outcomes, and then evaluates whether patients' care is consistent with indicators based on evidence-based standards of care (Mainz 2003:523)

Different approaches to indicators have been developed that fall broadly into two categories. Rate based indicators use data about events that are expected to occur with some frequency (Idvall et al. 1997), for example, the occurrence of pressure ulcers in a given patient population. Sentinel indicators identify undesirable events, (Idvall et al. 1997), such as the mortality rates associated with death rates during surgery. Both rate and sentinel indicators are developed from evidence based standards of care. They can be derived from empirical evidence (e.g. Cochrane reviews, meta-analyses or randomised controlled trials) and/or a consensus of experts (e.g. clinicians, researchers, patients). Therefore indicators can be

described according to the strength of scientific evidence for their ability to predict outcomes (Mainz 2003).

Clinical quality indicators can measure performance in one or more of the dimensions outlined and their number in health care is potentially limitless (see Appendix 1 which provides an example of some of the commonly used nursing and midwifery CQIs). However, some CQIs are more directly related to aspects of health care delivery that mainly reflect medical and multi-disciplinary interventions and health policies, and therefore are not considered to be particularly nursing or midwifery sensitive. With reference to nurse sensitive CQIs, Griffiths et al. (2008) observes that depending on the definition, the number of nursing quality indicators could run into the hundreds.

#### **4.2 Nurse and Midwifery Sensitive Clinical Quality Indicators**

Nursing and midwifery sensitive CQIs are used to evaluate the quality of nursing /midwifery care (Idvall et al. 1997). Specifically, they are measures of change in health status in which nurses or midwives have direct influence on outcome (International Council of Nurses 2001), where there has been a measurable change in the patients health, related to the receipt of nursing care (Griffiths 2009). With reference to National Database of Nursing Quality Indicators (NDNQI) used in the United States, Montalov (2007) further proposes that patient outcomes which are determined to be nursing sensitive are those that improve if there is a greater quantity or quality of nursing care. Crucially, Griffiths et al. (2008) emphasise that nurses must have responsibility for actions that lead to the outcome of CQIs in relation to legitimate authority, self-perception and sphere of practice. Importantly, criteria for indicator choice are dependant on evaluation of the empirical evidence that a specified indicator is nurse sensitive (Griffiths et al. 2009, Montalvo 2007).

To summarise, the development of nurse and midwifery sensitive CQIs should be supported by the following criteria and should:

- reflect structure, process or outcome (Gossard and Wilson 2009)

- recognise that variations in the delivery of nursing and midwifery care affect outcome (Griffiths et al. 2009, Gossard and Wilson 2009, Hatem et al. 2008)
- acknowledge that nurses and midwives have responsibility and legitimate authority for the care event (Griffiths et al. 2009, RCOG et al. 2007)
- be widely applicable within nursing and midwifery settings (Griffiths et al 2009, Midwifery 2020 Programme 2010b)
- apply to a large percentage of the patient population (Griffiths et al. 2009)
- be measurable with available data at reasonable cost (Griffiths et al. 2008, NHS III 2009, DoH 2009)
- have robust systems for collection, analysis and reporting of CQI outcomes (Montalvo 2007, Boukdedid et al. 2010, King's Fund 2008, Scottish Government 2008 )
- support electronic data-capture for monitoring and comparison purposes (Boukdedid et al. 2010, King's Fund 2008, Scottish Government 2008, Midwifery 2020 Programme 2010b)
- demonstrate a correlation or multivariate association between some aspect of the nursing workforce or a nursing process and the outcome (Montalvo 2007)
- be derived from an evidence base (Mainz 2003, RCOG et al. 2007, NHS III 2009, DoH 2009)
- should be valid and reliable (Mainz 2003, DoH 2009)

Taking into account the criteria for nursing and midwifery CQI development it is perhaps not surprising that reservations have been noted about their application. Even with a given set of criteria Nakrem et al. (2009) makes the challenging observation that determining what aspects of nursing care should and can be measured differs among many National Health Services. From the literature reviewed by Nakrem et al. (2009) they expressed concerns about the validity and reliability of some nurse-sensitive CQIs used for nursing home care. They

recommended that the development of CQIs follows a sound process that includes extensive empirical testing. In a review of nursing metrics, Griffiths et al. (2008) also acknowledges that little consistency exists between nursing indicator sets. Possible reasons may be that nurses operate as part of a team and no professional group completely influences patient outcomes (Griffiths et al. 2009). This point is illustrated by Griffiths et al. (2009) who undertook a scoping exercise about the nursing contribution to quality in cancer care. In total, eleven outcome areas were identified that had the potential to demonstrate sensitivity to nursing activity with ambulatory chemotherapy. From the eleven indicators reviewed, they suggested that the strength of evidence was not strong that some outcomes were sensitive to nursing care. Their evaluation concluded that the strongest set of nurse sensitive indicators included; safe medication administration, nausea and vomiting and the patient experience. In relation to some other indicators, for example, pain and nutrition, they found only possible association between nursing and outcomes.

Within the Scottish nursing and midwifery context, the launch of the review of the Senior Charge Nurse/Midwife Role supported the development of a core set of CQIs which aims to provide patients with care that is patient centred, safe, effective, efficient, equitable and timely (SEHD 2006). In England, the NHS Institute for Innovation and Improvement (NHS I 2009, DoH 2009) have identified eight high impact actions that have been acknowledged as having potential opportunity in terms of improvements to quality and patient experience and reduction in cost to the NHS. NHS Wales have recently developed so-called intelligent targets predominantly outcome measures which have been tested and proven to deliver within a service (Gossard and Willson 2009). More recently the Midwifery 2020 (Midwifery 2020 Programme 2010b) has recognised numerous sources of “maternity indicators” and identified what it sees as those indicators which reflect the necessary dimensions of quality care (SEHD 2006). All these CQIs are closely aligned with principles that support safe, effective and efficient care delivery. Each of the CQI databases described here are examples of initiatives to improve the quality culture in healthcare where the nursing or midwifery workforce have been identified as making visible impact on care quality outcomes. Commonly, with all the CQIs identified, data are collected and evaluated on unit specific nurse-sensitive indicators that

contains information on nursing staff mix and nursing hours for the acute care setting and indicators that describe structure, process and outcomes of care.

### **4.3 Selection and Justification of CQIs**

As previously acknowledged, the number of potential clinical indicators that can be used to evaluate different aspects of clinical practice is vast. Indeed, the international literature provides evidence of a plethora of indicators that are used as measures for care structures, processes and outcomes. Griffiths et al (2008) propose that the front runners in the nurse sensitive indicator stakes fall into in three main categories. These are; patient safety, for example failure to rescue and falls; effectiveness which includes staffing levels and skill mix; and compassion that includes the reported experience of the patient. Determining which CQIs to review was therefore key, not least because it was important to select indicators that are recognised as having a clear nursing or midwifery focus and reflect important key aspects of nursing or midwifery care. Importantly, reference to CQIs which meet the development criteria as listed in section 4.2 ensures that these have confirmed validity and reliability as nurse or midwife sensitive indicators. We were further constrained by the confines of this study to provide an overview of all potential nurse and midwife led indicators. For nursing we decided to focus on the core set of CQIs that have been identified with Senior Charge Nurse Review (Scottish Government 2008). These have application across a range of health care settings including, acute hospitals, old-age psychiatry, rehabilitation areas and community hospitals. In midwifery, those indicators which have been evidenced as having the greatest impact on outcomes have been reviewed.

### **4.4 Pressure Ulcer CQI**

It is estimated that much as 4% of NHS spending in the UK is dedicated to pressure ulcer care, with an approximated annual cost of £2 billion (NHS QIS 2009). There is recognition that the development of pressure ulcers causes significant physical and psychological damage to patients, as they are associated with increased risks of morbidity and mortality (Bo et al. 2003, Allman 1997). For example, pressure ulcers

delay healthcare discharge and are linked to an increased risk of secondary infection (NHS QIS 2009). Therefore, pressure ulcer treatments give rise to both clinical and cost challenges for the NHS as well as causing considerable pain and suffering for those patients who develop them.

It is generally accepted that most pressure ulcers that develop in NHS settings are avoidable (Ward et al. 2010a) and clinicians believe as many as 95% of pressure ulcers are preventable with appropriate care and intervention (NHS QIS 2009). It is therefore not surprising that pressure ulcer prevention is recognised as being paramount to patient safety and is a key clinical quality indicator of the care the patient receives (NHS QIS 2009). While pressure ulcer prevention requires input from multidisciplinary teams (Ward et al. 2010a, NHS QIS 2009), there is recognition that skin care and prevention is closely associated with quality nursing care (Wurster 2007, NHS QIS 2005). Therefore, it does feature as one of the most common clinical indicators and is supported as a nursing sensitive outcome (Van den Heede et al. 2007). In a review of the most frequent identified nursing indicators, pressure ulcers was the most frequently represented (Griffiths et al. 2008). Indeed, Jull and Griffiths (2010) suggest that pressure sore prevention is seen as a key quality indicator of nursing care.

In order to review the evidence that examines the nursing contribution to pressure ulcer prevention, it is helpful to focus on risk assessment as most guidelines recommend an initial risk assessment on admission to hospital (NHS QIS 2009, NICE 2005). Tannen et al. (2010) highlights how the planning and performance of nursing interventions and pressure reducing measures are normally based on this assessment and therefore have obvious parallels with CQI implementation. Pressure ulcer risk assessment is used to identify those at risk of developing pressure ulcers and alert practitioners to factors that pre-dispose individuals to ulcer development. Over 40 risk assessment tools have been developed that can be used for patients in different clinical settings (Moore and Cowman 2008). However an intervention review of evidence by Moore and Cowman (2008) found that no high quality evidence existed that addressed the question of whether undertaking structured pressure ulcer risk assessment reduced the incidence of pressure ulcers.

Similar findings were reported by Anthony et al. (2008) in a review that considered the validity and reliability of pressure ulcer risk tools. Findings from the review suggested that education and clinical judgement of the nurse may just be as important as risk tools. A study by Webster et al. (2010) aimed to test the validity of the Waterlow screening tool found that screening had not led to any reduction in the incidence of pressure injury. They suggested that reasons may be attributed to lack of equipment such as weight scales to complete the tool accurately. Furthermore they suggested that nurses used their clinical judgment, rather than scoring systems to identify patients at high risk. Additional evidence supporting the importance of the nurses' clinical judgment is highlighted in a study by Paquay et al. (2010) that investigated the determining factors for the application of measures for pressure ulcer prevention. Findings demonstrate that the nurses' clinical judgement played a significant role in ulcer assessment.

A study by Van den Heede et al. (2009) of acute hospitals in Belgium, did not indicate an association between staffing levels and incidence of a range of selected patient outcomes, which included pressure ulcers. Surprisingly, a study by Shuldham et al. (2009) exploring the relationships between staffing characteristics and a number of patient outcomes including pressure ulcers, demonstrated an increased rate of pressure sores with added nursing hours per patient day. However Shuldham et al. (2009) suggest that this result might be linked to a higher probability of pressure sore detection by staff who had more time to be attentive to the problem.

Although pressure ulcers are frequently identified as a nurse sensitive indicator, the evidence that they fully demonstrate improvement in the quality of care given by nurses resulting in improved patient outcomes is not entirely clear. When attempts are made to isolate and identify the contribution of nurses to this indicator, a range of influential factors do emerge that are associated with the nurses' professional knowledge and practice. These are further explored in section 5.

#### **4.5 Falls prevention CQI**



Patient falls have been reported to account for 40% of all hospital adverse occurrences (Groves et al. 1993). Although falls are common among elderly hospital in-patients of any countries (Rubinstein et al. 1994, Morse 1996), they are often preventable, frequently unreported, and often cause injury and unnecessary restriction of activity which results in a reduction in overall health and quality of life (Chang and Ganz 2007). In addition to causing injury, falls can be a strong indicator of accelerating frailty and the presence of other risk factors such as gait and balance disorders, functional impairment, visual deficits, and cognitive impairment (Rubenstein et al. 1994, Nevitt 1997, Tromp et al. 2001). Several studies have indicated that the risk of falling increases dramatically as the number of risk factors increases with 65% - 100% of elderly individuals with three or more risk factors falling in a 12 month period compared with 8% - 12% of patients with no risk factors (Robbins et al. 1989). The basis of most fall prevention programmes is identifying risk factors, one of the strongest of which is previous falling. Inquiring regularly about recent falls can help detect this risk factor and lead to appropriate evaluations and interventions. A systematic review and meta-analysis of RCT's of interventions to prevent falls has shown that multi-factorial falls-risk assessment and management programs are effective in reducing the risk and rate of falling (Chang et al. 2004). Chang and Ganz (2007) identified 12 quality indicators deemed to be valid in ameliorating the complex and serious problems of falls and mobility problems in older persons. These included detection and documentation of falls, orthostatic vital signs, visual acuity testing and balance evaluation. Chang and Ganz (2007) concluded that only if the underlying risks are recognized using a comprehensive approach such as the 12 quality indicators, will a reduction in falls in this high risk population be seen. Williams et al. (2007) however has highlighted that after a systematic review on falls risk assessment tools, none could be recommended as all lacked accuracy, failed to test for reliability or validity and did not report sensitivity or specificity.

Falls prevention has been a concern for nurses in the acute care sector for decades. In a review of the most frequent identified nursing indicators, falls was one of the most highly represented (Griffiths et al. 2008). Most of the research studies in this area are descriptive and fail to provide the quality of evidence required to underpin nursing practice (Oliver et al. 2000). The research that does exist focuses on two

main areas; the identification of the 'at risk' patient (Nandy et al. 2004, Petitpierre et al. 2010) and also the testing of certain interventions e.g. exercise regimes change of environment (Donald and Shuttleworth 2000). The difficulties of conducting research in this area have been described by O'Connell and Myers (2001) as nurse's lack of ownership of their own practice. It is important to state that although high numbers of institutional fall rates may reflect poor practice, such as inadequate staffing, the maintenance of a risk environment and excessive use of sedation, it may also reflect a culture in which residents are being encouraged to mobilise and allowed to take reasonable risks. Equally, a low falls rate may reflect good institutional practices, with attention being directed towards individual and environmental falls risk factors. However, it may also indicate that inappropriate restraint, overt or covert, is being employed (Murdo and Harper 2004). As has been described earlier in relation to pressure sore assessment, literature pertaining to falls prevention indicates that it may be the assessment of the risk of the fall that is important rather than the risk tool in itself.

In an Australian study reviewing the impact of a quality improvement through a Transforming Care at the Bedside programme (TCAB) Chaboyer et al. (2010) reported a reduction in falls resulting in harm. TCAB involved both nursing managers and front-line staff working together to implement improvement strategies. Although a range of factors were identified by the authors that contributed to improved patient outcomes, both nursing leadership and a focus on nursing care at the bedside were identified as important factors (Chaboyer et al. 2010).

To summarise, the completion of any assessment tool gives falls prevention an emphasis that may not have been achieved otherwise and that may simply have provided a focus for the application of clinical judgement (Dempsey 2004). However it is clear that the development and implementation of falls risk assessment and interventions involves a collaborative and multidisciplinary approach and is simply more than the nurse's role. As such, all healthcare professionals dealing with patients known to be at risk of falling should develop and maintain basic professional competence in falls assessment and prevention (NICE 2004).

## **4.6 Food, Fluid and Nutrition CQI**

Malnutrition in hospitalised patients has been a significant issue for a number of years and continues to remain a problem (McWhirter and Pennington 1994, Lean and Wiseman 2008). The term malnutrition can encompass a wide range of deficiencies (e.g. protein-energy, vitamins, fibre, water) that may or may not be associated with adverse health outcomes (Reuben 2007). The number of malnourished hospitalised patients in the UK has risen by 85% over the last 10 years, which is partly because of the lack of attention of nursing and medical professionals (Lean and Wiseman 2008). This is particularly so for the older adult where studies have demonstrated that nutritional health is suboptimal for hospitalised patients on admission to hospital and that the prevalence of under-nutrition is high (Kubrak and Jensen 2007, Reuben 2007). However current reported factors associated with malnutrition fall into two main categories, personal and organisational, personal being further subdivided into physical and social causes. Isabel et al. (2003) concur that in addition to the physical and psychological effects of malnutrition, malnourished patients have longer hospital stays that increase the cost of hospitalisation.

Organisational factors identified to be associated with malnutrition include lack of nutritional screening, or assessment and documentation, inadequate training of medical and nursing staff, confusion regarding nutritional responsibility, increased nursing workload and lack of adequate nutritional intake (Perry 1997; Campbell et al. 2002; Pedersen 2005).

Patients, who are ill, particularly in hospital, are more at risk of under nutrition, which in turn may delay their recovery and increase the risk of complications (NHS QIS 2006). The increase in adverse events associated with under nutrition is reported in a number of studies and includes such issues as impaired wound healing, increased sepsis, impaired immune function, impaired muscle function and strength, increased fatigue, inability to complete rehabilitation and increase mortality, indicating that more attention needs to be paid to adequate nutrition (Pedersen 2005; Kubrak and Jensen 2007; Gunnarsson et al. 2009). Indeed Hafsteinsdottir et al. (2010) further highlight

a number of similar adverse outcomes associated with malnutrition in patients who have had a stroke.

NHS QIS (2003) published National Standards for Food, Fluid and Nutrition to assess the performance of nutritional care and provision throughout NHS Boards in Scotland and to address the risk of under-nutrition in hospitals. This was in response to the Scottish Executive's commitment to improve the quality of nutritional care provided in hospitals outlined in 'Our National Health: A Plan for Action, A Plan for Change' (Scottish Executive 2000). The findings from an overview of three out of the six standards indicates that although a number of Boards were performing against some of the standards there was still considerable work to be undertaken (NHS QIS 2006). One such area is in the use of a validated nutritional screening tool which Kubrak and Jensen (2007) suggest should be targeted particularly at specific groups of patients such as the older person. They further argue that since clinical indicators used to detect malnutrition may be confounded by other factors it is recommended that a combination of clinical indicators be used to assess risk for and presence of malnutrition.

The importance of nutritional assessment and screening is articulated in a number of studies and is identified with particular adverse events such as pressure ulcer development. Barrett et al. (2009) and Gunnarsson et al. (2009) both highlight the importance of nutritional support and intervention by nurses to identify patients at risk in relation to the development of pressure ulcers. Schindler et al. (2010) conclude that nutritional routines and care remain poor in Europe and that establishing proper nutritional risk screening is an important starting point for improving nutritional care and ultimately outcomes.

In response to the challenges outlined, nutrition has been identified as a nurse sensitive CQI. However, evidence from policy and research tend to place emphasis on multi-disciplinary responsibility. For example, NHS QIS (2006) emphasise the requirement to have a co-ordinated approach to nutritional assessment and care. In a study of nutritional status of neurological patients Hafsteinsdottir et al. (2010) suggest that nurses need to conduct a nutritional screening, but with brief practical tools. Significantly, Hafsteinsdottir et al. (2010) advise that more detailed

assessments should be carried out by the nurse and dietician. An extensive European study by Schindler et al. (2010) concluded that the presence of dieticians and/or assistants and the use of screening tools promoted improved nutrition. It may therefore not be surprising that in a review of the most frequent identified nursing indicators, nutrition was not represented (Griffiths et al. 2008).

In summary, similar to falls prevention, the nutritional status of patients is a multidisciplinary concern.

#### **4.7 Midwifery CQI**

In the previous sections, the nursing CQIs identified may have some applicability in midwifery but of themselves they are not sufficiently sensitive in the context of midwifery to indicate the impact of midwife-led care.

CQIs in midwifery have developed from both structure, process and outcome measures, rate and sentinel indicators (Boulkedid et al. 2010; DoH 2008; RCOG et al. 2007; National Quality Forum 2009; NHS Information Centre for Health and Social Care 2009; HCC 2008; Midwifery 2020 Programme 2010b). Practice supported by the statutory framework of supervision in midwifery (NMC 2004) has maintained the on-going evaluation of the care midwives provide, using the available local and national data. Such is the opportunity for discrete midwifery care, the measurement and evaluation of its impact is more readily attributed directly to the midwife. As maternity services have diversified offering a variety of care settings including the home setting, midwifery and other researchers have evaluated the impact of these choices and care patterns.

Midwifery 2020, a review of midwifery across the 4 countries of the UK, was published in September 2010 (Midwifery 2020 Programme 2010a, 2010b). Four working streams contributed to the main report, one of which focussed on measuring quality (Midwifery 2020 Programme 2010b). This group's subsidiary report suggested that government leads, regulatory and professional bodies drive forward the further development of CQIs. This recognition of the need for national CQIs is

very welcome given the strength of evidence for the impact of midwife-led care throughout the continuum of childbearing. The midwifery CQIs with the greatest impact have been singled out in this review. There are many others which can be used alongside these to support the quality of midwifery care. The chosen indicators reflect Montalov's (2007) criteria that outcomes for women and their babies improve when there is a greater quantity of midwifery care.

#### **4.7.1 Midwife-led care**

Midwives are the lead professional for healthy women through the childbearing continuum. As such, the impact of midwife-led care has been subject to rigorous review over a number of years and is recognised as essential in providing quality care (Hattem et al. 2008; Villar et al. 2001; Midwifery 2020 Programme 2010b). Midwife-led care has a measurable and beneficial impact on care which effect outcomes for women and their babies (Hattem et al. 2008; Villar et al. 2001). Women receiving midwife led care are less likely to require hospital admission in the antenatal period, require regional anaesthesia, instrumental delivery, more likely to experience no intrapartum analgesia/anaesthesia, spontaneous vaginal birth, feeling in control in labour, attendance at birth by a known midwife and to initiate breast feeding (Hattem et al. 2009, Caird et al. 2010).

The value of midwifery can and should continue to be demonstrated through outcome data (DoH 2009). The measure with the highest impact is midwife-led care. Midwife-led care has a beneficial impact for women at low or high risk (Hattem et al. 2008). However the organisational structure must be in place to support direct access to a midwife. Keeping Childbirth Natural and Dynamic (KCND) (SGHD 2008) has been fundamental in Scotland in enabling the local and national infrastructure to support such access and care. NHS Highland Maternity Services Strategy 2010 (NHS Highland 2010) aims to provide midwife-led care for low risk women which has equitable access across all areas

#### **4.7.2 One-to-one care in labour**

A systematic review conducted in 2007 considered how changes in the provision of maternity care within the hospital environment had reduced continuous support for women in labour (Hodnett et al. 2007). Although this review considers those other than midwives who could offer continuous support in labour, one-to-one care provided by a midwife has a beneficial impact on women and their babies. One-to-one care in labour increases the normal birth rate, women are likely to have a slightly shorter labour, are less likely to have intrapartum analgesia or to report dissatisfaction with their childbirth experiences (Hodnett et al. 2007; NCT 2010; King's Fund 2008; DoH 2009; RCOG 2008; HCC 2008; Midwifery 2020 Programme 2010b; Caird et al. 2010). In summary more continuity of midwifery care improves outcomes for mother and baby (DoH 2009).

#### **4.7.3 Promoting normal birth**

In Scotland the KCND (SGHD 2008) initiative has drawn together the evidence from local and national publications (policy, reviews and research) to recommend community focussed, midwife-led care for healthy women experiencing uncomplicated pregnancies, and where necessary multidisciplinary maternity team care for women with more complexity. This initiative as part of the Quality Improvement Scotland's strategy builds upon the existing evidence base to ensure the care women receive is women-centred, safe and effective. In 2009 the NHS Institute for Innovation and Improvement similarly identified that promoting normal birth was cost effective and this CQI was included as one of the High Impact Actions for midwifery (NHSI 2009). The normal birth rate is also one example of an intelligent target to be used in Wales (Midwifery 2020 Programme 2010b; Gossard and Wilson 2009).

In July 2010, the Department of Health published a white paper (DoH 2010) which proposed to focus on measurable outcomes that are more meaningful to patients rather than NHS processes. The paper suggests that in practice, comprehensive outcome indicators are not always available or feasible, and that in the short term

Carefully chosen proxy outcome measures may be used. More recently in September 2010 the Midwifery 2020 Programme (2010a) has identified a number of CQIs which could be used as future quality indicators and intelligent targets. These include those which have an existing evidence base including midwife-led care, one-to-one midwifery care in labour for all women, and promoting normal birth.

CQIs which are contained within the existing published dashboards and scorecards vary (HCC 2008, RCOG 2008, King's Fund 2008, National Quality Forum 2008, DoH 2009, Boulkedid et al. 2010). There have been suggestions that both national and local perspectives should be expressed in CQI data collection (Boulkedid et al. 2010, RCOG 2008). The dashboards used by some areas may contain measures which may be judged as crude or too severe nevertheless the local applicability, dissemination and comprehension is vital if for example the universal utility of midwife-led care as a clinical quality indicator is to be continually evaluated and care improved upon.

## **5. Key Themes from Reviewed Literature**

Key themes which emerged from the literature that influences implementation and outcome of CQIs are identified in this section. These have key relevance to nursing and midwifery practice as they help to describe conditions that are significant for nurse and midwife CQI implementation and help to explain how nurses and midwives influence care delivery.

### **5.1. Clinical Judgement**

In the nursing literature the terms clinical judgement, problem solving and critical thinking are often used interchangeably. In this report we use the term clinical judgement to mean the "interpretation or conclusion about a patient's needs, concerns, or health problems, and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient's response" (Tanner 2006:204). In other words, clinical judgement relies on the ability to arrive at and implement care decisions based on the patients' condition.



The evidence from the literature suggests that clinical judgment by nurses and midwives play a significant part in the implementation of the CQIs reviewed. If, as the evidence suggests, risks tools cannot accurately and reliably predict risk (Papanikolaou et al. 2007, Kottner et al. 2009, Webster et al. 2010) the literature does however highlight the importance of clinical judgment in relation to risk assessment and decision making is emphasised (Tannen et al. 2010). Webster et al. (2010) go as far as suggesting that the arbitrary cut-off scores in risk tools cannot replace thorough nursing assessment, careful, ongoing observation and the development of individualised care plans. Following a systematic review of the literature, Bates-Jenson and MacLean (2007) concluded that there was less evidence to support a direct link between the use of risk assessment tools and lower incidence of pressure ulcers or superiority of risk assessment tools over clinical judgment. Anthony et al. (2008) suggests that the nurses' clinical judgement is useful for helping to identify patient at risk of developing pressure ulcers. The Royal College of Nursing (2001) also recommends that risk assessment tools be used as an adjunct to, rather than replacement for clinical judgement. There is therefore less evidence to support a direct link between the use of risk assessment tools and the lower incidence of pressure sores or superiority of risk assessment tools over clinical judgement.

## **5.2 Leadership**

The relevance of leadership to nurse sensitive CQIs has emerged as an important attribute in the literature and is clearly identified in national health agendas. According to the American Nurses Association (2004) the nurse leader is responsible and accountable for maintenance of professional standards, including outcomes such as pressure ulcer care. The leadership agenda in relation to CQIs was clearly set out by Scotland's Chief Nurse in the introduction to Leading Better Care,

The development of strong nursing and midwifery clinical leadership in the NHS, backed by quality indicators that set benchmarks for service delivery, will provide the basis for improved patient outcomes, improved experiences of care and improved opportunities for patients and families to have a real say in the way their care is planned and delivered. (Scottish Government 2008)

The literature has emphasised the role and responsibility of the nurse leader in improving nurse-sensitive indicators (Clarke et al. 2004, Wurster 2007). In midwifery, the consultant midwife can provide leadership to ensure CQIs are delivered (RCOG et al. 2007). 'The Safe Birth: Everybody's business' report (King's Fund 2008), highlights that effective leadership is needed at a number of levels in maternity units. It is this strong dynamic clear leadership which is key to maintaining morale, improving team working and delivering CQIs in the clinical environment (RCOG et al. 2007).

Evidence demonstrates how nursing leadership has a considerable impact on pressure ulcer guideline implementation and improved patient outcomes. For example, ongoing and constant leadership had been shown to improve consistency of care and documentation of outcomes (Clarke et al. 2004). Higher levels of nurse manager support have been associated with lower rates of pressure ulcers and mortality (Boyle 2004), falls prevention and reduction in the proportion of reported medication errors (Chaboyer et al. 2010). Conversely, lack of consistent leadership is cited as a barrier to guideline implementation (Clarke et al. 2004).

### **5.3 Autonomous Practice**

Notions of autonomous practice and the knowledge and authority that support decision making in nursing and midwifery are closely aligned. With reference to CQI implementation Griffiths et al. (2008) assert that nurses must have responsibility for their own sphere of practice. In midwifery, the literature suggests that autonomous practice is now firmly established. The RCOG et al. (2007) recognised the midwife's central role as an autonomous practitioner in the care of childbearing women. The context of midwifery care has of itself helped to develop the evidence base for the clinical indicators included within this review in so far as midwives alone provide care for many women without the need to refer to any other health professional.

The nursing literature is more critical of the assumption that nurses are able to act autonomously, with the authority to influence the conditions that affect nurse sensitive CQIs. For example, whilst issues of staffing and patient demands may be influential on patient falls, Dempsey (2004) suggests that this does not completely explain the situation. Instead she highlights the rigidity of hospital systems, nursing

culture and work that does not encourage or value autonomy (Dempsey 2004). Nakrem et al. (2009) also highlight how structure indicators were judged to be less influenced by nurses.

Solutions for these challenges are presented in the literature. Reflecting on evidence which suggests that strategies for promoting best practice are not always followed, Paquay et al. (2010) recommends that clinical guidelines should be integrated into practice which takes account of strategic and cultural barriers. Dempsey (2004) argues that if nurses were granted the freedom to make decisions about patient safety and were supported in those decisions by managements, the rate of patient falls may start to reduce. The requirement for nurses to be involved in the design systems and processes that protect patients from adverse events are emphasised by a number of authors (Thornlow 2009, Griffiths et al. 2008).

#### **5.4 Staffing levels**

A number of the papers reviewed made direct reference to the association between staffing levels and direct patient outcomes (Van den Heede et al.2009, Shuldham et al. 2009). Staffing levels can include the organisation of the nursing workforce, skills mix, and the work environment (Van den Heede et al.2009). The importance of staffing levels is emphasised by Griffiths (2009) who suggests that nursing sensitive outcomes are outcomes that are influenced by variations in the quality or quantity of care received.

While there have been some studies that have established a link between CQI outcomes and staffing levels, the evidence for association is not fully conclusive and can be contradictory. Shuldham et al. (2009) contends that the evidence does suggest a direct relationship between staffing levels and patient outcomes for specific nurse-sensitive indicators, with lower patient to nurse ratios associated with better outcomes. Their study explored the relationship between nurse staffing characteristics that included the nursing hours worked by permanent and temporary staff and nurse hours per day and a range of patient outcomes. They found a weak association between nursing staffing and patient outcomes (Shuldham et al. 2009). Similarly, a Belgian study by Van den Heede et al. (2009) failed to demonstrate a direct relationship between nurse staffing levels and patient outcomes for nurse-

sensitive indicators. However, in a UK study of 20 NHS Trusts, Aiken et al. (2002) found that hospitals with the most favourable staffing levels had lower mortality and failure-to-rescue rates than hospitals with less favourable staffing levels. Similar results around failure-to-rescue rates provide strong supporting evidence for these conclusions (Needleman et al. 2002, Rafferty et al. 2007, Kane et al. 2007). Duffield et al. (2010) also concluded that there exists an accumulating body of evidence that demonstrates registered nurses are associated with fewer negative patient outcomes. Therefore, while Shuldham et al. (2009) suggests that research which establishes a relationship between nursing staffing and patient outcomes has so far failed to establish a causal relationship, extensive studies in the US (Kane et al. 2007) and UK (Aitken et al. 2002) demonstrate positive direct links between nurse staff levels and lower mortality and failure-to-rescue rates.

Additionally, the significance of the actual time a nurse spends with a patient emerges as an interesting consideration. Shuldham et al. (2009) found a weak association between nurse staffing levels and patient outcomes. The relevance of actual time spent directly with patients has according to Williams (1998) articulated the tension created by the inability of nurses to deliver quality of care in the current context as a problem of time. As nurses time diminished, Bowers et al. (2010) describe how nurses reprioritised and altered their work by changing their focus and attending only to the immediate needs of patients. On understaffed units, evidence indicates that nurses are forced to minimise or omit certain tasks, thereby increasing the risk of negative patient outcomes (Schubert et al. 2008). Dempsey (2004) maintains that nurses no longer have time to deliver anything other than the most basic physical care and their capacity to deliver quality care has been seriously eroded. In the context of research on patient falls, this may well be the missing link. Dempsey (2004) likewise note that it is the 'being with' that is significant in the rising incidence of patient falls.

In relation to midwifery, the NHS Litigation Authority sets standards as part of its Clinical Negligence Scheme for Trusts (CNST). One of these standards is staffing levels. The King's Fund 'Safe Childbirth' (King's Fund 2008) devotes a chapter to safe staffing levels of midwives whereby all women should have the one-to-one care from a midwife during labour (Hodnett et al. 2007). In the hospital setting the

emphasis is ensuring the availability of the appropriate number of midwives and obstetricians with different levels of experience (King's Fund 2008; RCOG 2008). There is clear evidence that the ratio of midwives to births impacts on both the safety and quality of maternity services and the mothers satisfaction (HCC 2008; Hatem et al. 2008; Gardosi et al. 2007; RCM 2009). Standards for midwifery staffing levels have been published (RCOG et al. 2007) and within the 'Maternity Dashboard Clinical Performance and Governance score card' (RCOG 2008) the importance of monitoring sickness levels use of bank staff within the workforce is also highlighted.

## **5.5 Education**

The importance of nurse and midwife education and knowledge, and their ability to use that knowledge to support implementation of CQIs has received some attention in the literature. For example, in their study of pressure ulcer guideline implementation, Clarke et al. (2004) relate how staff identified helpful educational interventions as key to successful application.

Conversely, it is not surprising that lack of nursing knowledge has been identified as a barrier to indicator application. Schindler et al. (2010) recognise that insufficient knowledge and training are major obstacles to good nutritional care. Similarly, Van Gaal et al. (2009) emphasise how knowledge about the content of any guideline is crucial for its use and therefore if nurses have insufficient knowledge they cannot give appropriate care. Grol (2001) observes that although many guidelines to prevent adverse events such as pressure ulcers, urinary tract infection and falls exist, compliance with guidelines appears to be lacking and as a result, many patients receive inappropriate care. The literature indicates that reasons for this are complex but education and knowledge of the nurse/midwife plays a key role. Numerous studies have shown the positive impact between education and practice knowledge and while such an examination is not within the scope of this review, it is yet important to highlight how successful application of CQIs requires to be underpinned by knowledge.

## **5.6 Data management**

Data and data management is a recurring theme in the CQI literature. The problems identified in the literature include inadequate feedback at team level to improve performance and existing IT systems which do not permit integrated data collection and handling (King's Fund 2008). High quality prospectively fed information reporting systems are critical in providing timely data on a small number of measures (Boulkedid et al.2010, King's Fund 2008, Scottish Government 2008). The midwifery dashboard, supplemented by an intelligible commentary page, can be used to show trends and trace performance over time (King's Fund 2008). This will help those who provide maternity to provide both retrospective and summative information to be able to report on standards and assess and improve their work (King's Fund 2008). The use of scorecards and dashboards to include both process and outcomes measures are also recommended (King's Fund 2008; DoH 2009; RCOG 2008; Bogossian 2010). There are a large number of outcome indicators which can be used in the NHS Highland Dashboard. Based on current policy and evidence the CQIs identified could also form part of the monitored metrics in maternity care in NHS Highland.

Dashboards can be developed to reflect complexity of the local clinical workload and clinical outcome indicators. Local solutions which make routine data collection as easy as possible (Scottish Government 2008, King's Fund 2008, RCOG 2008) require to be developed to ensure reliable data can be used to evaluate care and combined with national data in order to benchmark performance (King's Fund 2008; Scottish Government Health Directorate 2008). Using an iterative approach that is making use of the data sets which are currently available including outcome, process or structure measures is recommended by Midwifery 2020 (Midwifery 2020 Programme 2010b). For the future a maternity dataset common to all countries of the UK should be developed and implemented (Midwifery 2020 Programme 2010b).

Importantly, data management also provides a vehicle whereby information about the success or otherwise of a CQI can be fed back to the nurses and midwives who have supported its implementation. In relation to midwifery, the King's Fund (2008)

emphasise how information is a powerful motivator and should therefore be made available to midwives in order to demonstrate the impact of their care.

### **5.7 Nurse–Sensitive CQI implementation in rural hospitals**

Most of the evidence considered in this review has been drawn from studies that have reviewed the impact of CQIs in larger urban centres. The transferability of CQI systems or results to smaller health establishments such as those found in rural areas is less well known. Griffiths et al. (2008) make the observation that indicators have potential application in a range of settings, but indicators suitable for acute hospitals have more evidence and better specification. Baernholdt et al. (2010) conclude that differences do exist between rural and urban hospitals environments and therefore there may be differences in the way in which quality of care is defined. Duffield et al. (2010) propose a number of observations around this issue suggesting that metropolitan hospitals may be thought to have sicker patients and thus are more deserving of staff. However, they put forward that those managing the patient burden in general medical and surgical units that are often found in rural hospitals, do not benefit from the same resources that are found in larger more specialised units. Baernholdt et al. (2010) highlight higher level of staff rotation and the higher proportion of elderly patients as being characteristic of rural community hospitals. Following a study of quality care perceptions in rural hospitals Baernholdt et al. (2010) concluded that quality measures should capture the unique features of rural hospitals. It is apparent that the influence or effect of location, in relation to rural hospitals and implementation of CQIs has not been fully considered. It may be that there are little differences between the experiences of CQI implementation in different hospital locations; alternatively, it may be that interventions should take account of the local contexts.

## **6. Discussion**

The aims of this review were to examine the evidence of how CQIs are being used to influence care delivered by nursing and midwifery practitioners, and from the evidence reviewed, to identify the quality indicators that are most readily applied to nursing and midwifery practice in NHS Highland.

It is apparent from the evidence reviewed that there is a growing trend in healthcare to use CQIs as a guide to influence care decisions and to measure performance and outcomes that inform on the quality of care delivered. The increased attention being directed at the nursing and midwifery CQIs contribution to care and patient outcomes has in UK healthcare, had particular focus through initiatives like the Senior Charge Review (Scottish Government 2008) and the high impact actions identified by the NHS III (2009).

Within the literature, some evidence of causal links between nurse and midwifery sensitive CQIs and positive patient outcomes have been explored; although these links are sometimes difficult to evidence in many CQIs. However, we were able to identify the distinct contribution nurses and midwives make to particular components of CQIs, and in particular to patient assessment and ongoing evaluation. The evidence to support the nurses' role in the food, fluids and nutrition CQIs was more limited. Nurse sensitive CQIs are a relatively new concept in the UK, and although more have been developed in the US, the evidence base is not fully developed. This important limitation was highlighted by the NHS QIS (2005) who made reference to the sustained effort that has been required in the US to promote CQI implementation. Therefore, it is difficult to clearly and consistently establish attributable cause and effect with regard to nursing care and patient outcomes. This conclusion is reflected by NHS QIS (2005) who identified a paucity of research that established a cause and effect between nursing actions and patient outcome, as well as determining whether the outcome was principally influenced by nursing. Furthermore, measurement of the nurses' influence on CQIs is complex as nursing care is mainly delivered in a multidisciplinary environment and therefore it can be difficult to extract the nurses' role. Griffiths et al. (2008) concur with this view and highlight the difficulty of determining the contributions nurses make to CQI's relative to other professions.

It was also apparent that rigorous development should preface nurse and midwifery CQIs to ensure they are sensitive and valid to the changes that they want to measure. Outcomes from this review reinforced the premise that indicators need to be derived from evidence and validated by practitioners and other expert groups.



This process helps to identify those indicators that are nurse and midwifery sensitive as well as determining how patient outcomes are truly influenced by the nurse or midwife. Additionally, for successful integration of CQIs into practice, it is important that nurses and midwives regard the indicators as being relevant to their practice. These development factors are important before decisions can be made about those indicators which are most readily applicable.

Some challenges still exist around the use of data collected and the confidence that this data accurately reflects the nursing or midwifery contribution to CQIs. In this respect we agree with Nakrem et al. (2009) who maintain that the evidence that quality indicators can demonstrate meaningful differences in care and that data can be extracted with minimal effort is not found. The Healthcare Quality Improvement Strategy for NHSScotland (Scottish Government 2010), has identified a range of improvement strategies that includes a quality measurement framework for related high-level outcome indicators.

Although precise measurement of the nursing contribution to CQIs is challenging, the themes identified in this review have to an extent helped to illustrate some of the specific contributions nurses and midwives make in practice. Nursing contributions to CQIs are not always easy to translate into specific outcomes because nursing is one part of the input to CQI's and successful patient outcomes. However, whilst the contribution of nursing to CQI's is sometimes difficult to measure there are a number of key contributions that nurses engage with. For example, nurses are at the frontline of patient care and are therefore pivotal to the delivery of high quality care through leadership and co-ordination of resources and skills. In the Senior Charge Nurse role, they function as clinical leaders and are key members of the broader healthcare team and therefore both influence and direct care. They are responsible for ensuring that care is delivered in a compassionate, safe and effective environment. They have responsibility for ensuring the measurement of indicators takes place and responding to feedback on CQI performance. While evidence of CQI achievement has a focus on collection of data, nurse and midwifery led teamwork and leadership make a significant contribution to sustaining quality and standards.

Arguably, CQIs represent a reductionist perspective of what nurses and midwives do in that they measure levels of performance which do not fully reflect their professional contribution to care. Griffiths et al. (2008) observe that neither effectiveness (positive contributions to well being) nor compassion (elements of the patients experience) are strongly represented in existing measures. It may be that future evaluation of initiatives, like 'Releasing Time to Care' (NHS III 2010) will help to more specifically evidence this unique contribution to CQIs by nurses and midwives.

With regard to remote and rural care, there is a paucity of evidence to inform us of the impact nurses and midwives have on CQIs in these care delivery contexts. Whilst it can be argued that standards of care, such as those demonstrated in CQIs have universal application within similar health systems, like the NHS, the literature does highlight some contextual conditions which may suggest that the particular needs and circumstances of rural hospitals are not fully accounted for. This finding is of particular interest to NHS Boards like NHS Highland who have a number of smaller community hospitals serving rural populations.

## **7. Limitations of review**

There is an expanding body of UK and international literature which addresses the implementation of an array of CQIs and other patient metrics that reflect and seek to measure the nursing and midwifery contribution to patient care. The ability to review a wider body of evidence was outwith the scope of this review.

## **8. Suggestion for further research**

An in depth review of the implementation of nurse and midwifery sensitive CQIs in non-acute, rural settings would help to inform of application across different healthcare contexts. Additionally, further investigation of how therapeutic factors, such as the way nursing and midwifery compassion play a part in positive CQI outcomes would provide a more insightful perspective of their contribution to care.



**Appendix 1 Table 1: Key References and Bibliography**

<b>First Author, Year, Country</b>	<b>Study Design</b>	<b>Intervention</b>	<b>Outcome Measures</b>	<b>Analysis and Results</b>	<b>Overall Conclusions</b>
<b>Anthony et al, 2008, Canada</b>	To consider the validity and reliability of risk assessment scales for pressure ulcers	Literature review	There is contradictory evidence concerning the validity of risk assessment scales. Interaction of education and clinical judgement could be significant		Need for further work exploring the interaction between assessment scales, clinical judgment and interaction
<b>Barrett R, 2009, USA</b>	Experimental	Implement best practices for the provision of nutrition support to pts identified as being at risk of pressure ulcers	No of nutrition consults, nursing staffs nutrition/pressure ulcer knowledge scores, % pt's at risk for pressure ulcers who received nutrition support	After nurse education, the no of nutrition consults increased by 167%	Nutrition assessment and support for pt's at risk for developing pressure ulcers are essential components of quality pt care
<b>Bates-Jensen et al, 2007, USA</b>	Review	Included in review supporting evidence of relationship between risk assessment in vulnerable elders t pressure ulcer		Studies reviewed show that Risk assessment can identify those at risk / improved documentation of interventions but there	

outcomes

is less evidence to support a direct link between use of risk assessment tools and lower incidence of pressure sores or superiority of risk assessment tools over clinical judgement. Only one study showed that use of RA tool was better than clinical judgement alone (Defloor & Grydonck 2005)

<b>Chaboyer, 2010, Australia</b>	Observational time series study in two medical units. Implementing 13 transforming care at bedside improvement strategies ( rapid improvement methodology) on medication errors, patient falls and pressure ulcers	<b>Aim:</b> The effects of implementing 13 Transforming care at the bedside improvement strategies on medication error, patient falls and pressure ulcers	Statistical process control analysis A consistent sustained improvement was demonstrated. Reported reduction in medication errors and falls by over half, but pressure areas less conclusive	A rapid change management cycle such as Transforming care at the bedside can be a useful process when implementing numerous clinical changes. Positive effects facilitated by – readiness for change by nurses, changes ‘easy for nurses to understand and implement - rapid change strategy and visible leadership key –although not clear how this info was obtained?
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**Chang, 2007, USA**      Review of 182      N/A      Which QI's have      12 QI's identified which

articles on quality indicators used to prevent falls

sufficient evidence to be valid for use as a measure for the quality of fall and mobility disorder detection

can potentially serve as a basis by which different care providers can measure and compare the quality of fall care and measure the quality of care delivered over time

**Clarke et al, 2004, Canada**

Longitudinal mixed methods (although not stated)

2 yr project to evaluate the use of multi component computer assisted strategies for implementing Clinical practice guidelines for prediction, prevention and management of pressure sores

3 themes emerged: time taken to learn and use computer and decision support system / Technology difficulties / avoidance of system -by referring to others

But nurses so risk assessment tools, plans of care and wound care grid as helpful – however some nurses referred to trust their own assessment skills. Leadership and lack of it seen as crucial

Does not tell us about patient outcome or nurses contribution to them

**Close, 2003, UK**

Review

Review which provides guidance on the key components of a comprehensive falls service as derived from the existing evidence base.

Clear evidence-based guidelines exist to inform and help in the development of falls services  
Resources should be channelled into evidence –based services A comprehensive assessment of falls should incorporate bone health  
Further evidence required to fill in gaps

<p><b>Dempsey, 2004, Australia</b></p>	<p>Uncontrolled before and after Acute Medical</p>	<p><b>Aim:</b> To test effectiveness of a falls prevention programme in an acute medical ward  <b>Intervention:</b> Falls prevention programme, with assessment tool, alert graph, education for patient and staff</p>	<p>Fall rate (per 1,000 occupied bed days)</p>	<p>Non-paired t –tests  Significant reduction in fall rate  Five years post-intervention, fall rate has doubled</p>	<p>Marginally effective falls prevention programme but results were not sustainable after 5 years</p>
<p><b>Donald, 2000, UK</b></p>	<p>RCT  Elderly care rehab ward in community hospital  N=54</p>	<p><b>Aim:</b> Comparison of two flooring types – carpet and vinyl – in bed areas and two types of physiotherapy conventional v's additional leg strengthening  <b>Intervention 1</b>  a. assigned to ward area with vinyl floor covering and conventional physio 1 or 2x daily  b. As 1a plus seated leg exercises  <b>Intervention 2</b>  2a. Assigned to ward area with carpet and conventional physio  2b. As in 2a plus seated leg exercises</p>	<p>1. No fallers during admission  2. Number of fracture falls</p>	<p>Mann-Whitney U-test and Chi-squared with Fishers exact test  1. No difference in number of fallers  2. No fall resulted in fracture</p>	<p>There is no evidence to support either intervention in preventing falls in rehab ward</p>

<b>Donoghue, 2005, Australia</b>	Uncontrolled before and after Acute aged care/elderly care ward	<b>Aim:</b> To prevent high risk inpatients on an acute aged care ward from falling <b>Intervention:</b> Pts at high risk of falling accompanied by volunteers on weekdays with objective to observe pts for signs of increasing agitation and if needed to reassure pt or contact nurse	Fall rate per 1,000 occupied bed days	Chi squared test Sig decrease fall rate	Significant positive effect of intervention on fall rate
<b>Gibberd, et al, 2004, Australia</b>	Review of CI's used in 185 Australian hospitals.	Important role of CI is to allow providers to monitor and improve their performances as well as compare with others	Assessment of CI's in 185 hospitals	CI should be reported by quantifying the potential gains thus encouraging action. CI's should allow for identification of areas with the greatest potential for improvement	Key is to regard CI as screening tools that measure performance in one or more dimensions
<b>Grenier-Sennelier 2002, France</b>	Survey design	Aim: Analyse potential value of quality management methods in the context of preventing falls in hospital	1. Assess context in which falls occurred. 2. Recommendations to prevent falls	Number of falls in unit was 18.3% with organizational causes identified in 66% of these.	QI methods shed new light on falls prevention. Prevention of falls lies in organization and management of care for hospitalised patients
<b>Griffiths and Jull, 2010, UK</b>	Review (NT)	Analysis of the evidence supporting risk		Research evidence recommends some	Nursing quality cannot be easily determined by



		assessment for pressure ulcer prevention		prevention strategies as effective	examining the specific prevention care provided. There is a need for better assessment tools that predict risk accurately.
<b>Griffiths P and Richardson A.</b>	Literature review and expert consultation	Identified shortlist of 11 outcome areas and assessed quality of evidence for sensitivity to nursing		No existing well evaluated indicators identified – but some strength of evidence for medication administration, nausea and vomiting and patient experience	Work to be done on selecting and applying process to monitor outcomes for nursing CQI's
<b>Gunnarsson, 2009, Sweden</b>	Quasi-experimental Patients with hip fractures post op	Intervention group received nutrition according to nutritional guidelines	Risk of pressure ulcers, pressure ulcers, weight, nosocomial infections, cognitive ability, walking assistance and functional ability	Sig fewer pts in intervention group had pressure ulcers five days post op compared with control group. Nutrient and liquid intake was sig higher in intervention group. Median length of stay decreased from 9 to 7 days as did nosocomial infections from 18 -8.7%	Pt's with hip fractures receiving nutrition according to nutritional guidelines developed fewer pressure ulcers
<b>Hafsteinsdottir, 2010, Netherlands</b>	Prospective descriptive	Neurological pts nutritional and functional status measured at admission to hospital and after 10 days	No's of pts either malnourished or at risk of being malnourished	At admission 34% pts at risk of malnutrition, 7% were malnourished. After 10 days 57% were at risk of malnutrition, 22% were malnourished	A large group of neurological patients are malnourished and at risk of malnutrition during hospital admission and the nutritional status of most

pts worsens in 10 days

<b>Handoll, 2010, UK</b>	Review	Effects of interventions for preventing falls in older people living in nursing care facilities and hospitals		(i) Various types of exercise were investigated but no sig diff in rate of falls or risk of falling (ii) Vit D supplementation showed a sig reduction in rate of falls but not risk of falling
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<b>Healthcare Commission, 2008, UK</b>	Policy doc by HC Commission to help falls service providers. 9 focus groups involving 40 participants	<b>Aim:</b> To gather patients views and experiences and produce recommendations so that falls service providers can develop the best services possible	Thematic analysis identified 4 themes (a) access, (b) assessment and interventions, (c) interpretations of falls (d) perceived benefits and critiques	Many recommendations including participants unaware of what falls services were available, GP's not aware of services
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<b>Ingersoll et al, 2000, USA</b>	Study to determine most appropriate indicators for APN's	Delphi study - Convenience sample of APN's identified indicators used to measure their effect on patient care. Survey of APN's to feedback on initial indicators selected.	27 core outcomes were identified and ranked.	
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<b>Jull &amp; Griffiths,</b>	Editorial	Asks if pressure sore	Suggests that there	Nursing should not uncritically assume that
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<p><b>2010, Australia, UK</b></p>	<p>prevention is a indicator of quality nursing care</p>	<p>is evidence to suggest that confidence in nursing actions and decisions that are typically within nursing sphere of responsibility are likely to make a difference, there is not enough evidence to be prescriptive about exactly what should be done under what circumstance</p>		<p>pressure ulcer prevention is a measure of the quality of care or that nursing quality can be easily determined by examining the specific preventative care used.</p>
<p><b>Kendall-Raynor, 2009</b></p>	<p>Not a research paper but reviews the DH's list of indicators</p>	<p>Review but not a research paper</p>	<p>Impt that nurses are able to take ownership of improving the quality of the care they deliver. Impt that measurements of care may not be the same and this will cause frustration</p>	<p>From April 2010 NHS organisations (England only) will need to publish quality accounts. To make the quality of nursing care visible, nursing indicators should be part of this.</p>
<p><b>Kerse, 2008, New Zealand</b></p>	<p>Clustered randomised trial</p>	<p><b>Aim:</b> To assess effectiveness of an activity programme in improving function, QOL, falls  <b>Intervention:</b> 330</p>	<p>Function QOL Falls</p>	<p>The prog. Had no impact overall. The prog of functional rehab had minimal impact for elderly people in residential care with normal cognition but was not beneficial for</p>

		residents offered goal setting and individualised activities of daily living activity prog.			those with poor cognition
<b>Kubrak, 2007, Canada</b>	Narrative Review	Review of empirical reports, reviews commentaries, reports		Malnutrition ranges from 13-78% of acute care patients	Malnutrition is a significant problem in acute care. The subjective global assessment tool has the most diagnostic value
<b>Lane, 1999, USA</b>	Uncontrolled before and after Medical/surgical/critical care pts  N=101 (baseline) N=98 (post-intervention)	<b>Aim:</b> To evaluate the effectiveness of a falls prevention prog in reducing patient fall rate  <b>Intervention:</b> Falls prevention prog including <ul style="list-style-type: none"> <li>Identifying pts at risk of falling</li> <li>Establishing guidelines for interventions promoting pt safety for pts at risk</li> </ul>	1. Fall rate per 1,000 pt days 2. Injury rate after fall (number of injuries per 100 falls)	Stats not clear 1. No change in fall rate 2. Decrease in injury rate	No effect of falls prevention prog in inpats at risk of falling
<b>Leading Better Care: Report of the Senior Charge Nurse Review and Clinical Quality</b>		CQI :			Leadership key

**Indicators Project,  
(2008), Scotland**

**Mainz, J, 2003,  
Denmark**

Reviews definitions, characteristics and categories of CI.

CI provide quantitative basis for QI. They can assess structure process or outcome of health care

Review

Monitoring health care impossible without the use of CI. They give basis for QI and prioritisation in health care. CI must be designed, defined and implemented with scientific rigour.

See Findings

**Moore & Cowman,  
2008, Ireland**

Cochrane review

Aim: to determine whether using structured, systematic pressure ulcer risk assessment tools in any health care setting reduces the risk of pressure sores

Outcome measures – RCT which compared use of structured, systematic pressure assessment tools with unaided clinical judgement or RCTs which compared different assessment tools

Analysis and results  
Risk assessment tools widely used but no RCT exists for comparisons with unaided judgement

Conclusions  
Evidence available that conducting a risk assessment makes any difference to the number of new pressure sores that occur (similar findings Bates-Jensen et al 2003)

**Nakrem S et al,  
2009, Norway**

Systematic Lit Review

Defs of QI provided

Systematic Lit Review

Provides defs of QI's. QI's measure within 3 domains of quality of care: structure quality, process quality, outcome quality

Although based in nursing homes, the defs and discussion of QI's is useful.

<b>Nandy, 2004, UK</b>	Development of a tool to be used in primary care or the community for the rapid assessment of the risk of falling	<b>Aim:</b> To validate the new tool which had 5 items (i) history of a fall, (ii) 4 or more prescribed medicines, (iii) diagnosis of stroke or Parkinsons, (iv) problems with balance, (v) inability to rise from a chair	Fall rate	The presence of 3 or more risk factors has a +ve predictive value of a fall in the next 6 months	The tool may be useful for identifying people who would benefit from further assessment of their risk of falling
<b>NHS QIS, 2010, Scotland</b>	Up and About: A reference resource for those involved in the palling, development, evaluation and delivery of services which aim to prevent and manage falls	<b>Aims:</b> Identify and describe the various stages of the journey of care Identify the disciplines, services, agencies, organisations potentially involved in fall prevention and management Provide views and experiences of older people and carers on the prevention and management of falls	Note: For care home residents and people living in the community. Not for hospital residents.		
<b>NICE, 2004, UK</b>	Clinical Guidelines	Falls: the assessment and prevention of falls in older people			
<b>Newman K, 2001, UK</b>	Reviews the complex	Lit review	Review	Nurse Job satisfaction is clearly linked to patient	The nurse is central to patients experience of

	interaction of nurse recruitment, retention healthcare quality and patient satisfaction			satisfaction.	care, level of satisfaction and perceptions of health care quality
<b>Paquay et al, 2010, Belgium</b>	To investigate the effect of implementation of a patient and family education programme on guideline adherence for pressure ulcers	Re-test-post test design used to evaluate implementation of education programme for five nursing home agencies		Guideline adherence of pressure ulcer formation changed after education. Guidelines implementation was observed principally in those at most risk – (as assessed by nurses)	
<b>Pedersen, 2005, Denmark</b>	Quasi-experimental	Special leaflet given to people before surgery on nutritional care. Pt met with nurse on admission to discuss eating habits, need for assistance, meal choices.  Control group = usual care	Energy intake, protein intake	The intervention group had an average intake of energy 23% higher and protein intake was 45% higher.	Patients active involvement in their own nutritional care was found to be effective to raise intake of energy and protein
<b>Petitpierre, 2010, Switzerland</b>	0 year retrospective study	<b>Aim:</b> Evaluate if the admission functional independence measure	FIM scores at admission and number of falls	Falls recorded in 19.4% of hospital stays. Stat sig relationship between total	The FIM was unable to predict risk of falls.

(FIM) score could be used to predict falls in older inpatients

FIM score and risk of falling, sensitivity, specificity, -ve and +ve predictive value were insufficient to predict falls

<b>Reuben, 2007, USA</b>	Lit Review	116 articles included in this review		Weight measurement impt at each primary care visit Vit D Supplementation should be given daily Oral intake should be documented	Quality Indicators for the care of Under nutrition in vulnerable elders is very impt.
<b>Roe, 2009, UK</b>	Exploratory qualitative design.  Convenience sample of 27 older people who had a recent fall. Interviewed and then repeated at follow up	<b>Aim:</b> To investigate older peoples experiences of a recent fall and its impact on health, lifestyle, quality of life, care networks		Majority of fallers fell indoors, were repeat fallers with more than half alone. Falls can result in a decline in health status	Informal care and support networks are as important as formal care for older people at risk of falls or who have fallen.
<b>Schindler K, 2010, Europe and Israel</b>	Longitudinal survey screening practice, types of tools used		Number of units using tools	52% of units used a tool. 27% of patients classified as being at nutritional risk	The process of nutritional risk assessment varied between units and countries



<b>Schwendimann, 2006, Switzerland</b>	Interrupted time series Internal medicine, geriatric and surgery inpatient depts. N=34,972	<b>Aim:</b> To examine in-pt fall rates and consequent injuries before and after implementation of interdisciplinary falls prevention programme	1. Inpatient fall rate per 1,000 pt days  2. Consequent injury rate (per year)	General linear model, ANOVA, Chi-squared test  1. Falls rates fluctuated from 9.1 falls per 1,000 pt days to 8.6 falls  2. Annual proportion of minor injuries decreased from 32.6% to 28.1%	Fall rates did not change after the implementation of the falls prevention prog. Whereas minor injury rate decreased and major injury rate increased.
		<b>Intervention:</b> <ul style="list-style-type: none"> <li>• Screening on admission for pts at risk of falls</li> <li>• Examination of these pts</li> <li>• Interventions for all patients to provide safety in the hospital</li> <li>• Intervention of pts at risk</li> <li>• Reassessment of those who fell</li> </ul>			

<b>Sherrington, 2008, Australia</b>	Systematic review with meta analysis	<b>Aim:</b> To determine the effects of exercise on falls prevention on older people. To establish whether particular characteristics or components of exercise programs are associated with larger reductions in falls.	Exercise reduced the rate of falling by 17%		Exercise can prevent falls in older people. Exercise that challenges balance have more +ve effects
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**Shuldham et al,** Case study To explore relationship Retrospective No statistical link

2008, UK

analysis

between staffing characteristics (hours worked) and patient outcomes: **pressure sores, patient falls**, GI bleed, pneumonia, sepsis, shock, DVT

hospital data form patient admin systems - details of pressure sores collated from prevalence data and falls form incident reports - regression model used to compare with nursing levels/ hrs worked

between staffing and falls -  
Only results for shock showed statistical significance

Smith J, 2009, UK

Describes the introduction of an acuity and dependency tool in a English NHS Trust

Review of the tool

Use of a tool that accurately assesses patient's needs can empower nursing staff to raise concerns when their workload rises and levels of patients needs changes.

Use of this tool allows nurses to articulate their needs clearly so that they can provide safe and high quality care.

Stevenson K et al, 2004, UK

Focus groups with Patients.

Patients given the opportunity to help shape the service provided by their practices

Focus groups

Sulla, 2006, USA

Discursive paper on a fall prevention programme

**Aims:**

- Define effective strategies or best practice for fall prevention
- Replicate effective

No results given but anecdotal evidence to suggest that new prog having a positive effect

Still much room for reduction in falls especially those that lead to injury.

- strategies
- Reduce fall rate in clinic by 50%
- Decrease levels of injuries
- Identify equipment and unit design to maximise fall prevention
- 

**Tinetti, 2010, US**

Systematic literature review on community living older adults and conditions predisposing to falls, predisposing conditions to falls, effective interventions

Strongest risk factors for falling include previous falls, strength, gait, balance impairments and use of specific medications

Evidence based fall risk assessment is feasible and effective

**Thornlow, 2009, USA**

Analysis of hospital patient safety records by age of pt

For 11 out of the 13 pt safety indicators, pts over 65 were more likely to be involved.

Hospitalised pt's 65 and over experienced higher rates of patient safety incidents than all other adult pts

**Van den Heede et al, 2009, Belgium**

Cross sectional analysis of linked data using cross sectional analysis of to study

Selected 10 indicators – pressure ulcers, DVT, cardiac arrests, infections,

Cost-of complications and infections and hospital acquired infections and pressure ulcers most frequent

No relationship detected between staffing levels and patient outcomes

association  
between nursing  
levels and patient  
outcomes

failure-to -rescue,  
cost-o  
complications

occurring adverse  
outcomes

**Van Gaal, 2010,  
Netherlands**

Cluster  
randomised trial

**Aim:** To describe the  
effect of interactive and  
tailored education of the  
knowledge levels of  
nurses

**Intervention:** Education  
for nurses on the  
implementation of  
guidelines for three  
frequently occurring  
nursing related adverse  
events (i) pressure ulcers,  
(ii) UTI's, (3) Falls.  
Wards randomly  
allocated to treatment or  
control

A knowledge test  
measured nurses  
knowledge on the 3  
areas

Linear random effects  
model to analyse  
difference in knowledge  
bwtm intervention and  
control wards

A stat sig effect on  
knowledge of pressure  
ulcers but not for the other  
2

**Van Gaal et al,  
2009,  
Netherlands**

Cluster  
randomised trial

Aim – to develop and test  
an integral patient safety  
programme that  
addresses several  
Adverse events(AE) in  
hospitals and nursing  
homes – pressure ulcers/  
falls and UTI

Developed patient  
safety programme  
to address the AE

<p><b>Wagner, 2005, Canada</b></p>	<p>Trial of new Incident reporting form in 3 nursing homes compared with 3 using existing forms</p>	<p><b>Aim:</b> Effect of falls menu-driven incident reporting system on quality improvement efforts in nursing homes</p> <p><b>Intervention:</b> Use of the new incident reporting system.</p>	<p>1. Compare documentation of fall characteristics on incident reports</p>	<p>Almost one third of residents across the 6 homes fell during study period. Documentation much clearer amongst homes using new recording sheets</p>	<p>The new reporting system can have a sig impact in improving how nursing staff assess residents following a fall incident. This model could enhance QI efforts.</p>
<p><b>Webster et al, 2009</b></p>	<p>Observational research : prospective cohort design</p>	<p>To assess the validity of the Waterlow instrument in a cohort of internal medicine patients and to identify factors contributing to pressure injury</p>		<p>Outcomes suggest poor predictive validity of Waterlow and suggest nurses' clinical judgment plays key role in assessment.</p>	<p>Further research required to provide definitive evidence on usefulness of Waterlow and compared with clinical judgment</p>
<p><b>Williams, 2007, Australia</b></p>	<p>Uncontrolled before and after  Medical wards of 1 hospital N=1,357 pt admissions</p>	<p><b>Aim:</b> To evaluate a systematic co-ordinated approach to limit the severity of falls and minimise their number in an acute care hospital</p> <p><b>Intervention:</b> Pts classified as low, medium, or high risk. Appropriate interventions (environment, mobility, elimination) were developed for each risk level in an individual fall</p>	<p>1. No of falls per 1,000 occupied bed days 2. Severity of falls</p>	<p>Mann-Whitney U-test and Students t-test</p> <p>1 Sig reduction in falls 2. No change in severity of falls</p>	<p>Approach was effective in reducing fall incidence</p>

care plan

**Wurster, 2007,  
USA**

Commentary

Identifies responsibilities and accountability of nurse leaders for prevention -

Suggests that nurse leaders are ultimately responsible for implementing standards and for occurrence of pressure sores while reducing health care costs

## Appendix 2 Table 2: A sample the most frequently identified nursing and midwifery CQIs

Adapted from Griffiths et al. 2008

Indicator	Area	Number of Sources
Pressure ulcer	Safety	11
Failure to rescue	Safety	9
Staffing levels (nursing and midwifery)	Effectiveness	18
Falls	Safety	8
Health care associated infection: pneumonia	Safety	8
Staff satisfaction and well-being	Effectiveness	7
Health care associated infection: urinary tract infection	Safety	6
Staffing, skill mix	Effectiveness	6
Medication administration errors	Safety	5
Mortality	Safety	5
Practice environment/perceived quality	Effectiveness	5
Satisfaction with (nursing) care	Compassion	5
Sickness rates	Effectiveness	6
Smoking advice	Effectiveness	5
Staffing bank or agency use (nursing and midwifery)	Effectiveness	5
Communication	Compassion	4
Staff experience, knowledge, skills and expertise	Effectiveness	4
Health care associated infection: surgical wound	Safety	4
Instrumental activities of daily living and self-care	Effectiveness	4
Perception of adequate staffing	Safety	4
Use of restraints	Compassion	4
Access to a midwife by 12 weeks	Effectiveness	6
Midwife-led care	Effectiveness	9
One-to-one care in labour	Effectiveness	9
Normal birth rate	Effectiveness	6

## REFERENCES

Aiken LH, Clarke SP, Sloane DM, Sochalski J, Sibber JH (2002) Hospital nurse staffing and patient mortality, nurse burnout and job dissatisfaction. *The Journal of the American Medical Association*, 288 (16) pp.1987-1993.

Allman (1997) Pressure ulcer prevalence, incidence, risk factors and impact. *Clinical Geriatric Medicine*, 13 pp.421-426.

American Nurses Association (2004) *Scope and standards for nurse administrators* (2<sup>nd</sup> ed). Washington DC.

Anthony D, Parboteeah S, Saleh M, Papanikolaou P (2008) Norton, Waterlow and Braden scores: a review of the literature and a comparison between the scores and clinical judgment. *Journal of Clinical Nursing*, 17 (5) pp.646–653.

Baernholdt M, Bonnie Jennings B, Merwin E, Thornlow D (2010) What does quality care mean to nurses in rural hospitals? *Journal of Advanced Nursing*, 66 (6) pp.1346-1355.

Barrett, R, Tuttle V, Whalen E, Gatchell C, Dawe A (2009) Pressure Ulcers and Nutritional Support. *Journal of Nursing Care Quarterly*, 25 (2) pp.145-150.

**Bo M, Massala M, Raspo S, Bosco F, Cena P, Molaschi M, Fabis F** (2003) Predictive factors of in-hospital mortality in older patients admitted to a medical intensive care unit. *Journal of the American Geriatrics Society*, 51 (4) pp.529-533.

Bogossian F (2010) An urgent call to implement systematic monitoring of a comprehensive set of quality indicators for maternity services. *Women and Birth*, 23 pp.36-40.

Boulkedid R, Sibony O, Bossu-Salvador C, Oury JF, Alberti C (2010) Monitoring healthcare quality in an obstetrics and gynaecology department using a CUSUM chart. *An BJOG: An International Journal of Obstetrics and Gynaecology*, 117 (10) pp. 1225-1235.

Bowers BJ, Luring C, Jacobson N (2001) How nurses manage time and work in long-term care. *Journal of Advanced Nursing*, 33 (4) pp.484-491.

Caird J, Rees R, Kavanagh J, Sutcliffe K, Oliver K, Dickson K, Woodman J, Barnett-Page E, Thomas J (2010) *The socioeconomic value of nursing and midwifery: a rapid systematic review of reviews*. London, EPPI Centre, Social Science Research Unit, Institute of Education, University of London.

Campbell SE, Avenell A, Walker AE (2002) Assessment of nutritional status in hospital in patients. *Quarterly Journal of Medicine*, 95 pp.83-87.

Chaboyer W, Johnson J, Hardy L, Gehrke T, Panuwatwanich K (2010) Transforming care strategies and nursing-sensitive patient outcomes. *Journal of Advanced*



*Nursing*, 66 (5) pp.1111-1119.

Chang JT, Morton SC, Rubenstein LZ et al (2004) Interventions for the prevention of falls in older adults: Systematic review and meta-analysis of RCT's. *British Medical Journal*, 328:680.

Chang JT and Ganz DA (2007) Quality Indicators for falls and mobility problems in Vulnerable Elders. *Journal of the American Geriatrics Society*, 55 (Supp. 2. 327-334).

Clarke H, Bradley C, Whytock S, Handfield S, Van Der Wal R, Gundry S (2004) Pressure ulcers: implementation of evidence based practice. *Journal of Advanced Nursing*, 49 (6) pp.578-590.

Dempsey J (2004) Falls prevention revisited: a call for a new approach. *Journal of Clinical Nursing* 13 (4) pp.479-485.

Department of Health (DoH) (2009) *Delivering high quality midwifery care: the priorities, opportunities and challenges for midwives*. London: Department of Health.

Department of Health (DoH) (2010) *Liberating the NHS: Transparency in outcomes-a framework for the NHS. A consultation on proposal*. London: Department of Health.

Dixon-Woods M, Agarwal S, Jones D, Young B, Sutton A (2004) *Integrative approaches to qualitative and quantitative evidence*. London: Health Department Agency.

Donabedian A (1980) *Explorations in Quality assessment and monitoring*. New York: Health Administration Press.

Donald IP and Shuttleworth H (2000) Preventing falls on an elderly care rehabilitation ward. *Clinical Rehabilitation*, 14 (2) pp. 178-185.

Duffield C, Diers D, O'Brien-Pallas L, Aisbett C, Roche M, King M, Aisbett K (2010). *Applied Nursing Research*. In press.

Duffield C, Roche M, Diers D, Cattling-Paul C, Blay N (2010) Staffing skill mix and the model of care. *Journal of Clinical Nursing*, 19 (15-16) pp. 2242-2251.

Gardosi J, Clausson B, Francis A (2007) The use of customised versus population based birthweight standards in predicting perinatal mortality. *BJOG* 114(10): 1301-2.

Gossard D and Willson A (2009) *Intelligent targets for NHS Wales*. Cardiff: Faculty for Healthcare Improvement.

Griffiths P (2009) RN + RN = Better care?: What do we know about the association between the number of nurses and patient outcomes. *International Journal of Nursing Studies*, 46 pp. 1289-1290.

Griffiths P, Jones S, Maben J, Murrells T (2008) *State of the art metrics for nursing: a rapid appraisal*. National Nursing Research Unit, London King's College, University of London.

Grol R (2001) Successes and failures in the implementation of evidence-based guidelines for clinical practice. *Medical Care*, 39 (8) pp.1146-1154.

Grol R and Grimshaw J (2003) From best evidence to best practice: Effective implementation of change in patients care. *Lancet*, 362 (9391) pp.1225-1230.

Groves JE, Lavori PW, Rosenbaum JF (1993) Accidental injuries of hospitalized patients. A prospective cohort study. *International Journal of Technology Assessment in Health Care*, 9(1) pp.139-144.

Gunnarsson A, Lonn K, Gunningberg L (2009) Does nutritional intervention for patients with hip fractures reduce postoperative complications and improve rehabilitation? *Journal of Clinical Nursing*, 18 (9) pp.1325-1333.

Hafsteinsdottir TB, Mosselman M, Schoneveld C, Riedstra YD, Kruitwagen CLJJ (2010) Malnutrition in hospitalised neurological patients approximately doubles in 10 days hospitalisation. *Journal of Clinical Nursing*, 19 (5-6) 639-648.

Hatem M, Sandall J, Devane D, et al (2008) Midwife-led versus other models of care for childbearing women (Cochrane Review). *The Cochrane Database of Systematic Reviews*. Issue 4.

Healthcare Commission (HCC) (2008) *Towards better births: A review of maternity services in England*. London: Commission for Healthcare Audit and Inspection.

Hodnett ED, Gates S, Hofmeyr GJ, Sakala C (2007) Continuous support for women during childbirth. *Cochrane Database of Systematic Reviews*. Issue 3. Art. No.: CD003766. DOI: 10.1002/14651858.CD003766.pub2.

Idvall E, Rooke L, Hamrin E (1997) Quality indicators in clinical nursing: a review of the literature. *Journal of Advanced Nursing*, 25 (1) pp.6-17.

International Council of Nurses (2001) *Nursing Sensitive Outcome Indicators*. Available from: <http://www.oebai.at/cms/wb/media/news-icn-pcn/NM%20Nursing%20Sensitive%20Indicators%20E.pdf> [Accessed 23 August 2010]

Isabel M, Correia MI, Waitzberg DL (2003) The impact of malnutrition on morbidity, mortality, length of hospital stay and costs evaluated through a multivariate model analysis. *Clinical Nutrition*, 22 (3) pp.235-239.

Joint Commission on Care Accreditation of Health Care Organisation (2007)

Available from:

<http://www.jointcommission.org/patientsafety/nationalpatientsafetygoals/> [Accessed 25 June 2010]

Jull A and Griffiths P (2010) Is pressure sore prevention a sensitive indicator of the quality of nursing care? A cautionary note. *International Journal of Nursing Studies*, 47 pp531-533.

Kane R, Shamliyan T, Mueller C, Duval S, Wilt T (2007) The association of registered nurse staffing levels and patient outcomes: systematic review and meta-analysis. *Medical Care*, 45 (12) 1195-1204.

King's Fund (2008) *Safe Births: Everybody's business*. London: King's Fund.

Kottner J; Tannen A; Dassen T (2009) Hospital pressure ulcer prevalence rates and number of raters. *Journal of Clinical Nursing*, 18 (11) 1550-1556.

Kubrak C and Jensen L (2007) Malnutrition in acute care patients; A narrative review. *International Journal of Nursing Studies*, 44 (6) pp.1036-1054.

Lean M. and Wiseman M. (2008) Malnutrition in Hospitals. *British Medical Journal*, 336 (290): 9 February.

McWhirter JP and Pennington CR (1994) Incidence and recognition of malnutrition in hospital. *British Medical Journal*, 308: pp.945-948 (9 April).

Mainz J (2003) Defining and classifying clinical indicators for quality improvement. *International Journal of Quality Health Care*, 15 (6) pp.523-530.

Midwifery 2020 Programme (2010a) *Midwifery 2020 Delivering expectations*. Available from: <http://midwifery2020.org.uk/documents/M2020Deliveringexpectations-FullReport2.pdf>. [Accessed 20 September 2010].

Midwifery 2020 Programme (2010b) *Workforce and Workload Work stream: Final Report*. Available from: [http://www.midwifery2020.org/documents/2020/Workforce\\_Workload.pdf](http://www.midwifery2020.org/documents/2020/Workforce_Workload.pdf) [Accessed 20 September 2010].

Montalvo I (2007) The National Database of Nursing Quality Indicators (NDNQ). *The Online Journal of Issues in Nursing*, 12 (3). Available from: <http://www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Volume122007/No3Sept07/NursingQualityIndicators.aspx> [Accessed 13 September 2010].

Moore ZEH and Cowman S (2008) Risk Assessment Tools for the Prevention of Pressure Ulcers. *Cochrane Database of Systematic Reviews* 2008, Issue 3. Art. No.: CD006471. DOI: 10.1002/14651858.CD006471.pub2. Available from: <http://onlinelibrary.wiley.com/doi/cochrane/clsysrev/articles/CD006471/frame.html> [Accessed 4 September 2010].

Morse K (1996) *Preventing Inpatient Falls*. London: Sage Publications.

Murdo A and Harper J (2004) Institutional falls: quality not quantity. *Age and Ageing*, 33 (4) pp.399-404.

Nakrem S, Guttormsen Vinsnes A, Harkless GE, Paulsen B, Seim A (2009). Nursing sensitive quality indicators for nursing home care: International review of literature, policy and practice. *International Journal of Nursing Studies*, 46 pp.848-857.

Nandy S, Parsons S, Cryer C et al (2004). Development and preliminary examination of the predictive validity of the falls risk assessment tool (FRAT) for use in primary care. *Journal of Public Health*, 26 (2) pp.138-143.

National Childbirth Trust (NCT) (2010) *Normal birth as a measure of the quality of care*. London: NCT.

NHS Highland (2010) *Maternity Services Strategy*. Inverness: NHS Highland.

NHS Information Centre for Health and Social Care (2009) *Indicators for Quality Improvement Report*. Available from: [www.ic.nhs.uk](http://www.ic.nhs.uk) [Accessed 15 September 2010].

NHS Institute for Innovation and Improvement (NHS III) (2009) *High Impact Actions for Nursing and Midwifery*. Available from: [http://www.institute.nhs.uk/images/stories/Building\\_Capability/HIA/NHSI%20High%20Impact%20Actions.pdf](http://www.institute.nhs.uk/images/stories/Building_Capability/HIA/NHSI%20High%20Impact%20Actions.pdf) [Accessed 23 July 2010].

NHS Institute for Innovation and Improvement (NHS III) (2010) *The Productive Ward Releasing Time to Care*. Available from: [http://www.institute.nhs.uk/quality\\_and\\_value/productivity\\_series/productive\\_ward.html](http://www.institute.nhs.uk/quality_and_value/productivity_series/productive_ward.html) [Accessed 4 September 2010].

NHS Quality Improvement Scotland (QIS) (2003) *Food, Fluid and Nutritional Care in Hospitals: Clinical Standards*. Edinburgh: NHS QIS.

NHS Quality Improvement Scotland QIS (2005) *Clinical Indicators*. Available from: <http://www.nhshealthquality.org/nhsqis/files/Clinical%20Indicators%202005.pdf> [Accessed 4 July 2010].

NHS Quality Improvement Scotland (QIS) (2006) *Food, Fluid and Nutritional Care in Hospitals: National Overview*. Edinburgh: NHS QIS.

NHS QIS (2009) *Best practice statement: Prevention and management of pressure ulcers*. Available from:

[http://www.nhshealthquality.org/nhsqis/files/PUPREVMAN\\_BPS\\_MAR09.pdf](http://www.nhshealthquality.org/nhsqis/files/PUPREVMAN_BPS_MAR09.pdf)  
[Accessed 28 June 2010].

National Institute for Clinical Excellence (NICE) (2004) *Falls: the assessment and prevention of falls in older people*. London.

National Institute for Clinical Excellence (NICE) (2005) *The management of pressure ulcers in primary and secondary care. A Clinical Practice Guideline*. Available from: <http://www.nice.org.uk/nicemedia/live/10972/29885/29885.pdf> [3 August 2010].

National Quality Forum (2009) *National Voluntary Consensus Standards for Perinatal Care 2008. A Consensus Report*. Washington. Available from: [http://www.qualityforum.org/Publications/2009/05/National\\_Voluntary\\_Consensus\\_Standards\\_for\\_Perinatal\\_Care\\_2008.aspx](http://www.qualityforum.org/Publications/2009/05/National_Voluntary_Consensus_Standards_for_Perinatal_Care_2008.aspx) [Accessed 13 September 2010].

Needleman J, Buerhaus P, Mattke S, Stewart M, Zelevinsky K (2002) Nurse-staffing levels and quality of care in hospitals. *The New England Journal of Medicine*, 346 (22) pp.1715-1722.

Nevitt MC, (1997). *Falls in the elderly*. In Masdue et al. *Gait disorders of aging*. Philadelphia: Lippincott-Raven 13-36.

Nursing and Midwifery Council (NMC) (2004) *Midwives Rules and standards*. London, NMC.

O'Connell B and Myers H (2001) A failed fall prevention study in an acute care setting: Lessons from the swamp. *International Journal of Nursing Practice*, 7 (2) pp.126-130.

Oliver D, Hopper AH, Seed P (2000) Do hospital falls prevention programs work? A systematic review. *Journal of the American Geriatric Society*, 48 (12) pp.1679-1689.

Papanikolaou P, Lyne P, Ratcliffe J (2007) **Using the discrete choice experimental design to investigate decision-making about pressure ulcer prevention by community nurses**. *Health & Social Care in the Community*, 15 (6) pp.588-609.

Paquay L, Verstraete S, Wouters R, Buntinx F, Vanderwee K, Defloor T, Gansbeke H (2010) Implementation of a guideline for pressure ulcer prevention in home care: pretest–post-test study. *Journal of Clinical Nursing*, 19 (13-14) pp.1803-1811.

Pedersen PU (2005) Nutritional Care; the effectiveness of actively involving older patients. *Journal of Clinical Nursing*, 14 (2) pp.247-255.

Perry L (1997) Nutrition: a hard nut to crack. An exploration of the knowledge, attitudes and activities of qualified nurses in relation to nutritional nursing care. *Journal of Clinical Nursing*, 6 (4) pp.315-324.

Petitpierre N, Trombetti A, Carroll I, Michel JP, Hermann F (2010) The FIM instrument to identify patients at risk of falling in geriatric wards: a 10 year

retrospective study. *Age and Ageing*, 39 pp.326-331.

Rafferty AM, Clarke SP, Coles J, Ball J, James P, McKee M, Aitken L (2007) Outcomes of variations in hospital nurse staffing in English hospitals: cross sectional analysis of survey data. *International Journal of Nursing Studies*, 44 (2) pp. 175-182.

Reuben DB (2007) Quality indicators for the care of under nutrition in vulnerable adults. *Journal of American Geriatrics Society*, 55 (S2) pp.438-442.

Robbins A, Rubenstein L, Josephson K (1989). Predictors of falls among elderly people. *Archives of Internal Medicine*, 149 (7) pp.1628-1633.

Royal College of Midwives (RCM) (2009) *Staffing Standard in Midwifery Services*. London: Royal College of Midwives.

Royal College of Nursing (RCN) (2001) *Pressure ulcer risk assessment and prevention*. London: Royal College of Nursing.

Royal College of Obstetricians and Gynaecologists (RCOG), Royal College of Anaesthetists, Royal College of Midwives, Royal College of Paediatrics and Child Health (2007) *Safer Childbirth: minimum standards for the organisation and delivery of care in labour*. London: RCOG.

Royal College of Obstetricians and Gynaecologists (RCOG) (2008) *Maternity Dashboard Clinical Governance and Governance Scorecard. Good Practice Guidelines No. 7*. London: RCOG.

Rubinstein LZ, Josephson KR, Robbins AS (1994) Falls in the nursing home. *Annals of Internal Medicine*, 121 (6) pp.442-451.

Schindler, K. et al. (2010) How nutritional risk is assessed and managed in European hospitals: A survey of 21,007 patient's findings from the 2007-2008 cross sectional nutrition day survey. *Clinical Nutrition (In press)*.

Schubert M, Glass T, Clarke S, Aitken LH, Schaffert-Witvliet B, Sloane DM, De Geest S (2008) Rationing of nursing care and its relationship to patient outcomes: the Swiss extension of the International Hospital Outcomes Study. *International Journal for Quality in Health Care*, 20 (4) pp.227-237.

Scottish Executive (2000) *Our National Health: A plan for action, a plan for change*. Available from: <http://www.scotland.gov.uk/Publications/2000/12/7770/File-1> [Accessed 15 July 2010].

Scottish Executive Health Directorate (2006). *Delivering Care, Enabling Health*. Edinburgh: Scottish Executive

Scottish Executive (2007) *Better Health Better Care; a discussion document*. Edinburgh: Scottish Executive.

Scottish Government (2008) *Leading Better Care: Report of the Senior Charge Nurse Review and Clinical Quality Indicators Project*. Edinburgh: Scottish Government.

Scottish Government (2010) *The Healthcare Quality Strategy for Scotland*. Edinburgh: Scottish Government.

Scottish Government Health Directorate (2008) *Keeping Childbirth Natural and Dynamic. Overview*. Available from: <http://www.scotland.gov.uk/Topics/Health/NHS-Scotland/nursing/naturalchildbirth/overview> [Accessed 30 July 2010].

**Shuldham C, Parkin C, Firouzi A, Roughton M, Lau-Walker M** (2009) The relationship between nurse staffing and patient outcomes: A case study. *International Journal of Nursing Studies*, 46 (7) pp.986-992.

Tannen A, Balzer K, Kottner J, Dassen T, Halfens R, Mertens E (2010) Diagnostic accuracy of two pressure ulcer risk assessment scales and a generic nursing assessment tool. A psychometric comparison. *Journal of Clinical Nursing* 19 (11) pp.1510-1518.

Tanner C (2006) Thinking like a nurse: A research-based model of clinical judgement in nursing. *Journal of Nursing Education*, 45 (6) pp.204-211.

Thomas E, Studdert DM, Burstin HR, Orav EJ, Zeena T, Williams EJ, Howard KM, Weiler PC, Brennan TA (2000) Incidence and types of adverse events and negligent care in Utah and Colorado. *Medical Care*, 38 (3) pp.261-271.

Thornlow D (2009) Increased risk for patient safety incidents in hospitalized older adults. *Medical and Surgical Nursing*, 18 (5) pp.287-289.

Tromp A, Pluijm S, Smit J, Deeg DJH, Bouter LM, Lips P (2001) Fall-risk screening test: A Prospective study on predictors for falls in community dwelling elderly. *Journal of Clinical Epidemiology*, 54 (8) pp.837-844.

Van Gaal BG, Schoonhoven L, Vloet LCM, Mintjes JAJ, Borm GF, Koopmans TCM, Achterberg Tv (2010) The effect of SAFE and SORRY? *International Journal of Nursing Studies*, 47(9) pp.1117-1125.

Van den Heede K, Sermeus W, Diya L, Clarke SP, Lesaffre E, Vleugels A, Aiken LH (2009). Nurse staffing and patient outcomes in Belgian acute hospitals: Cross-sectional analysis of administrative data. *International Journal of Nursing Studies*, 46 PP.928-939.

Villar J, Carroli G, Khan-Neelofur D, Piaggio GGP, Gulmezoglu Am (2001) Patterns of routine antenatal care for low-risk pregnancy. *Cochrane Database of Systematic Reviews* Issue 4.

Ward L, Fenton K, Maher L (2010) The high impact actions for nursing and midwifery 4: your skin matters. Online *Nursing Times*, 106 (30). Available from: <http://www.nursingtimes.net/nursing-practice-clinical-research/specialists/wound-care/the-high-impact-actions-for-nursing-and-midwifery-4-your-skin-matters/5017848.article> [Accessed 23 August 2010].

Webster J, Gavin N, Nicholas C, Cloemena K, Garner G (2010) Validity of the Waterlow scale and risk of pressure injury in acute care. *British Journal of Nursing*, 19 (6) pp.14-22

Williams AM (1998) The delivery of quality nursing care: a grounded theory of the nurse's perspective. *Journal of Advanced Nursing*, 27 (4) pp.808-816.

Williams T, King G, Hill AM, Rajagopal M, Barnes T, Basu A, Pascoe G, Birkett K, Kidd H (2007). Evaluation of a falls prevention programme in an acute tertiary care hospital. *Journal of Clinical Nursing*, 16 pp.316-324.

Wilson R, Harrison BT, Gibberd RW, Hamilton JD (1999) An analysis of the causes of adverse events from the Quality in Australian Health care study. *Medical Journal of Australia*, 170 pp.511-515.

World Health Organisation (2004) Available from: <http://www.who.int/patientsafety/worldalliance/en/> [Accessed 2 August 2010]

Wurster J (2007) What role can nurse leaders play in reducing the incidence of pressure sores? *Nursing Economics*, 25 (5) pp.267-269.



