

Nurse Sensitive Outcomes & Indicators in Ambulatory Chemotherapy

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Table of contents

Summary	3
Introduction	4
Why nurse sensitive outcomes?	5
Aims and objectives	6
Methods	7
Results	9
<i>Stage 1: Quality/outcome indicators</i>	9
<i>Stage 2: Evidence for nurse sensitive outcomes</i>	10
Consensus exercises	16
Discussion & conclusions	17
Recommendations	18
Conclusions	21
References	22
<i>Appendix 1: Search strategies and web sources searched</i>	28
<i>Appendix 2: Potential quality outcome dimensions and indicators</i>	31
<i>Appendix 3: The 'long list' of possible quality areas</i>	38
<i>Appendix 4: The 'shortlist' of outcome areas</i>	39
<i>Appendix 5: Suggestions for specific indicators of safety and effectiveness</i>	39

Summary

The Nursing Contribution to Quality in Cancer Care work stream was established by the National Cancer Action Team in the spring of 2009. A work group was set up to take forward a range of developments and tasked with delivering a set of actions around core issues that pertain to nursing workforce and the Cancer Reform Strategy. Its specific focus is on quality and outcomes of care. This report summarises the first stage of a project to develop a system of indicators for quality outcomes that are sensitive to nursing in ambulatory chemotherapy. This review aimed to identify and assess the evidence for indicators and to identify a small number of priority areas for development of a pilot system. To do this we undertook a series of scoping reviews and consultations with clinical experts. We identified a shortlist of 11 outcome areas and assessed the quality of evidence for the sensitivity of these to nursing. Overall, the strength of evidence was not strong although there was a clear indication that some outcomes may be sensitive to nursing care. We could find no existing well evaluated sets of indicators but identified the development of indicators for safe medication administration, nausea and vomiting and patient experience as strong candidates for incorporation into a pilot system. Considerable challenges lie ahead in terms of arriving at precise definitions of indicators, the best means of risk adjustment and development of robust and feasible systems for data collection.

Introduction

The Nursing Contribution to Quality in Cancer Care work stream was established by the National Cancer Action Team in the spring of 2009. A work group was set up to take forward a range of developments and tasked with delivering a set of actions around core issues that pertain to the nursing workforce and the Cancer Reform Strategy¹. Its specific focus is on quality and outcomes of care.

The cancer nursing workforce must be able to respond to new challenges and new ways of working if nurses are to play a full role in ensuring successful implementation of the strategy. There are several aspects highlighted in the Cancer Reform Strategy that will have a direct impact on the nursing workforce. These include

- Shifts in the location and environment for care delivery
- The drive to improve the experience of people living with cancer
- Ensuring people get better treatment
- Better information on services and outcomes to enhance patient choice and drive up quality

In particular the group is addressing the contribution of the specialist nursing workforce, including issues around equity of access and variation of role, seeking to clarify and strengthen the contribution specialist nurses make to the quality and outcomes of care.

Chemotherapy services have been identified as an area where there appears to be a considerable variation in quality. Significant concerns were raised in the 2008 report 'For better, for worse – a report of the National Confidential Enquiry into Patient Outcome and Death'² and from cancer peer review regarding the safety and quality of chemotherapy services. The report 'Chemotherapy Services in England: ensuring quality and safety'³ called for a '*step change in the quality and safety of chemotherapy services*' (p 5) and proposed actions that need to be taken by commissioners and providers to ensure high quality care. Furthermore, it identified that leadership, information systems, governance, monitoring and commissioning of chemotherapy services should be critical areas for focus. It firmly underlined the leadership role that nurses play in this environment. It also identified that information on outcomes was not routinely collected in a systematic way across the country and the need to progress work on metrics that can be used to monitor safety and quality.

As part of its work, the Nursing Contribution to Quality in Cancer Care work group set out to develop a set of outcome based metrics for care quality in key settings where nurses can make a significant contribution to patient outcomes in cancer care, and to link this work to national work on quality indicators initiated by the NHS Next Stage Review⁴⁻⁵.

The initial phase of this work focuses on ambulatory chemotherapy as an ideal context for developing and testing a system of quality metrics. This is frequently a nurse led care and treatment management environment where quality of nursing care may potentially have a significant impact on patient outcomes across the range of domains of effectiveness, safety and experience which were identified in the Next Stage Review. Assessment of the quality of care provided by nurses in this context is a high priority. The overall quality of services has been identified as a variable and, furthermore, the Cancer Reform Strategy makes it clear that the use of chemotherapy is likely to continue to increase, as is the trend to deliver this in an ambulatory environment¹.

Why nurse sensitive outcomes?

As part of the Next Stage Review a commitment was made '*to develop an indicative set of metrics to define and measure the quality of nursing care, as part of the quality metrics to be developed for the whole clinical team*'⁴ (p18). Our previous review of the 'state of the art' of systems of quality measures for nursing, commissioned to inform the review, suggested a range of potential indicators that might be derived from existing data sets in the foreseeable future⁶. However, the candidate measures were heavily skewed toward acute inpatient care. This was partly because of the heavy reliance on administrative data sets to identify outcomes and partly because of the scarcity of nursing processes that could clearly and specifically be linked to outcomes.

Subsequent developments, including the publication of the Indicators for Quality Improvement⁷, confirm that existing measures that are routinely available and which strongly reflect the quality of nursing care are scarce. Despite this, it seems clear from accumulating evidence of association between nurse staffing and quality that nurses do indeed make a significant contribution to quality that is reflected not just in 'soft' outcomes of patient experience but also in 'hard' outcomes, including mortality⁸⁻¹⁰.

The Next Stage Review argued that high quality teams measure what they do and issued the challenge to teams to achieve this. If quality is not measured how can it be properly established and demonstrated? Nurses clearly operate as part of a team and no one professional group wholly determines patient outcomes. However, while global quality outcomes (such as mortality) may reflect the performance of a team as a whole they do not necessarily reflect variation in important patient outcomes which may be more sensitive to variations in the work of particular professional groups or components of the system. The more a particular measure reflects the important contribution of a particular professional group or sub team it seems logical the more engaged they can be in taking action to improve quality based upon it. While there is wide interest in the use of quality measurement as part of a range of initiatives (including Commissioning for Quality and Innovation¹¹) that emanated from the Next Stage Review, it is clear that central to the purpose is that quality measures should be used to motivate and empower the clinical team.

Thus in seeking quality indicators for nursing teams in ambulatory chemotherapy, the aim is to identify measures that relate to important outcomes that are not just known to be sensitive to the contribution of nurses but which also fulfil a range of other criteria to ensure they can engage and motivate the nursing team. Further, since indicators can never fully measure 'quality' as a whole it is important that across the system there is a range of indicators¹². If different team members of a clinical service adopt and develop indicators that reflect their own important contributions then a broader picture of quality can be built up for the service as a whole.

Broadly indicators must measure important phenomena, be scientifically sound, provide useable information and be feasible to collect¹³. We summarized the requirements for nursing indicators, to engage and motivate nurses within the clinical team in our previous report. Key issues include:

- indicators must be measurable
- data must be obtainable at relatively low cost
- gathering data must not place undue additional burden on the clinical team

-
- significant variation in the indicator must be attributable to nursing in the sense that:
 - the phenomenon is recognized as important
 - there is a recognised contribution of nursing
 - there is evidence to support sensitivity to nursing
 - nurses must 'own' responsibility (in terms of legitimate authority, self perception and sphere of practice)
 - variation in outcome attributable to nursing must be substantial or the link between a nursing structure or process and the outcome must be strong

 - there must be wide applicability within settings, applying to a large proportion of patients

Where indicators are to be open to external scrutiny there is a real danger of gaming, so that performance on the indicator is given priority over the 'quality' it is meant to represent. Some measures of process are particularly vulnerable to this. The key to avoiding this is to select a parsimonious set of indicators where the effort involved in collecting them is justified by their perceived (and actual) usefulness to improving the quality of patient care.

Aims and objectives

This work was commissioned to identify and assess the evidence for indicators which could be used to indicate quality nursing care which leads to improved patient outcomes in ambulatory cancer chemotherapy services, and to identify a small number of priority areas for development of a pilot system. The work aimed to replicate the approach taken in our previous work⁶ but with a more detailed focus on this clinical setting. To do this we undertook a series of scoping reviews and consultations with clinical experts.

Methods

The project progressed in 2 stages.

Stage 1. The databases Medline, Embase and the British Nursing Index, Google and Google scholar were searched (see appendix 1) to identify indicator systems and potential areas for nurse sensitive outcomes. We sought sources that proposed quality measures or provided overviews of nurse sensitive outcomes that could be relevant to ambulatory chemotherapy. Although we focussed our searches on cancer care we considered material from other clinical areas where we came across it. We developed a 'shortlist' of the most strongly supported outcomes by a combination of ranking (number of sources identifying the outcome) and expert opinion (consultation with a reference group of clinical experts).

Stage 2. We searched Medline and the Cochrane library for research evidence supporting the outcomes on the shortlist as nurse sensitive (see appendix 1 for example search). We sought primary research evidence from controlled trials or observational studies for sensitivity of particular outcomes to known markers of quality and quantity of nursing care (for example well staffed units, units recognised as high quality, units with good leadership or teamwork) and we sought high quality systematic reviews or evidence based guidelines for evidence of clearly effective nursing interventions.

It was beyond the scope of this project to undertake a full review of all available evidence from individual studies of effectiveness and therefore we were unable to make a formal assessment of the evidence if we did not identify existing high quality research syntheses or evidence based guidelines. However, wherever possible we assessed the strength of evidence and recommendations using a single simple grading system¹⁴ using three categories for assessing quality of evidence (high, moderate, weak: A, B, C) and two for the strength of recommendation (strong or weak: 1,2) (Table 1). Where guidelines used other grading systems we mapped their recommendations onto this framework. Based on all these lines of evidence we determined whether the outcomes were definitely (unambiguous strong evidence) likely (moderately strong evidence), possibly (less strong/clear evidence) or potentially (scant research evidence but some support) sensitive to nursing care. This rating was used to formally and consistently describe our subjective judgements of the evidence.

We also sought consensus about the relative importance of the outcome areas by undertaking an informal consensus exercise with the reference group and those who attended two workshops at a Cancer Network Development Programme event (NDP). Attendees at the latter included network nurse directors, lead nurses, consultant oncologists, consultant nurses, patient group representatives and strategic health authority cancer leads. The groups were asked to indicate what they thought were the four outcome areas most useful as measures of quality for ambulatory chemotherapy and the four most important to patients.

Table 1 – Grading recommendations

Grade of recommendation/ Description	Benefit vs risk and burdens	Quality of supporting evidence	Implications
1A/strong recommendation, high-quality evidence	Benefits clearly outweigh risk and burdens, or vice versa	RCTs without important limitations or overwhelming evidence from observational studies	Can apply to most patients in most circumstances without reservation
1B/strong recommendation, moderate-quality evidence	Benefits clearly outweigh risk and burdens, or vice versa	RCTs with important limitations (inconsistent results, methodological flaws, indirect, or imprecise) or exceptionally strong evidence from observational studies	Can apply to most patients in most circumstances without reservation
1C/strong recommendation, low-quality or very low-quality evidence	Benefits clearly outweigh risk and burdens, or vice versa	Observational studies or case series	Recommendation but may change when higher quality evidence becomes available
2A/weak recommendation, high-quality evidence	Benefits closely balanced with risks and burden	RCTs without important limitations or overwhelming evidence from observational studies	Best action may differ depending on circumstances or patients' or societal values
2B/weak recommendation, moderate-quality evidence	Benefits closely balanced with risks and burden	RCTs with important limitations (inconsistent results, methodological flaws, indirect, or imprecise) or exceptionally strong evidence from observational studies.	Best action may differ depending on circumstances or patients' or societal values
2C/weak recommendation, low-quality or very low-quality evidence	Uncertainty in the estimates of benefits, risks, and burden; benefits, risk, and burden may be closely balanced	Observational studies or case series	Other alternatives may be equally reasonable

Adapted from Guyatt G, Gutterman D, Baumann MH, Addizzo-Horis D, Hylek EM, Philips B, et al. *Grading strength of recommendations and quality of evidence in clinical guidelines*. Chest 2006 129 (1): 174-81 © American College of Chest Physicians 2006 – reproduced with permission.

Results

Stage 1 Quality/outcome indicators

The initial searches yielded a number of sources from which we identified potential areas for indicator development. While we found many ‘indicator’ statements (giving broad descriptions of attributes of a quality service or its outcomes) we found no systems that had developed these into systems of measurable indicators.

We initially grouped potential indicators into three broad areas (outcomes, safety and a third more diverse group of processes, structures and workforce [PSW]). Within each were grouped a number of domains. Domains were classified in the ‘outcome’ area where a specific measurable patient or family attribute was either directly asserted to be nurse sensitive or could be inferred as the desired endpoint of a specified care process. The domains had varying degrees of generality, depending upon the descriptions found within the literature. The ‘safety’ area comprised of domains where literature referred to processes where a number of potential adverse events could result from failures in critical aspects of care but the specific events were not necessarily highlighted (e.g. safe medication administration implied or was linked to a number of outcomes including infection and extravasation). The PSW area was comprised of domains where the link to outcome was general and specific outcomes could not be inferred (e.g. workforce knowledge and skill). Against each domain we listed suggested indicators derived or implied by the literature. We also added indicators which seemed relevant and had been suggested in other domains, so for example ability to perform activities of daily living was listed as a potential indicator of fatigue and as an indicator of well being and function [Table 2]

Table 2 – Domains of potential nurse sensitive quality indicators

Outcomes	Safety	PSW
Anaemia ¹⁵⁻¹⁶	Safe medication administration ⁷⁻⁸	Care Delivery processes ²⁹
Cardiac toxicity ¹⁷	^{17 19-20 22 28-30 32 35 37-38}	Internal Regulations/Compliance
Constipation ¹⁸⁻²²	Safety (other) ^{7-8 17 22 26 28-30 35 37 39}	^{7 17 29 37}
Diarrhoea ^{15 17-19 21}		Resource Utilisation ^{17-19 29 31 35}
Dyspnea ^{18-20 22-26}		Workforce organisation/management ^{8 29 31 40}
Experience ^{7 17 23 27-31}		Workforce Resources ^{7-8 17 27-29 31 39}
Family well being ^{20 22 29}		Workforce Skill & Knowledge
Fatigue ^{18-20 24}		^{8 17 24 29 31}
Fertility ¹⁷		Workforce Wellbeing ^{8 17 22 27 29 31 39}
Hypersensitivity reactions ¹⁷⁻¹⁹		
Hypertension ¹⁷		
Nausea & Vomiting ^{15 18-21 23 32}		
Nutrition ^{20-21 24}		
Oral Mucositis ^{18 20-21 24 33-34}		
Pain ^{15 18-22 28-29 35-36}		
Wellbeing & Function ^{7 17-26 28-29}		
Peripheral Neuropathy (chemotherapy induced) ^{17-18 20}		
Education & Communication ^{17 22 27-29 35 37}		
Septicaemia ^{17-20 32-33}		
Skin ulcer ^{19 25-26}		
Sleep disturbances ¹⁸⁻¹⁹		

These categories were not mutually exclusive but served to organise the diverse material found and provide a framework for consultation and determining focus. They were

derived from a total of 28 sources. The diverse nature of the literature is such that this is unlikely to be a completely comprehensive list but we reached a stage where additional sources ceased to add new domains (suggesting saturation of the categories at this level). The initial list was considered by the project reference group who endorsed it, added a small number of additional potential indicators and identified priority areas for further consideration in ambulatory chemotherapy (see appendix 2 for more detail on potential indicators).

Stage 2 Evidence for nurse sensitive outcomes

The search for evidence of sensitivity to nursing inputs using the priority list formulated at the end of stage 1 focussed on outcome domains that were identified in six or more sources OR were identified as priority areas by one or more members of the project reference group. We considered the safety domain of safe medication administration as an outcome but excluded the more general domain 'safety' from this definition as it was comprised of a broad range of highly specific outcomes or non specific safety processes. The outcomes overlapped with topics which appeared in other domains. This gave us a shortlist of 11 areas to focus on (see table 3).

Table 3 – Shortlist of outcome domains

Diarrhoea
Education & communication
Experience
Fatigue
Nausea & vomiting
Nutrition
Oral Mucositis
Pain
Safe medication administration
Septicaemia
Wellbeing & function

The overall level of evidence was weak. We found no outcomes that were supported as sensitive to nursing by unambiguous strong evidence. While for many of our outcome domains there are individual trials of nursing interventions, we found relatively little clear evidence that would establish the interventions as fully supported by evidence (i.e. clear evidence of effect derived from a high quality systematic review of trials) and none to indicate an association between outcomes and variation in presumed dimensions of service quality from a well designed study (factors such as leadership, training, staffing levels and other domains identified in our PSW group at stage 1). The following sections summarise the evidence found for each domain.

Diarrhoea

The rapidly dividing cells of the gastrointestinal tract render it vulnerable to cytotoxic chemotherapy and diarrhoea is a frequent symptom following chemotherapy⁴¹. While there is some evidence to support recommendations (1 A/B) for specific drug therapies for the treatment and prevention of diarrhoea or abdominal discomfort⁴¹ we found no

evidence which suggested the impact of nursing interventions or variation in nursing service quality on any measure of diarrhoea or abdominal discomfort.

Conclusion: Possibly sensitive to nursing intervention

There is an assumed patient benefit from a high quality nursing service because a quality service will be more likely than a low quality service to identify the patient problem through assessment and ensure that recommended therapies are prescribed. The outcome is an important one and it is specifically associated with the management of some groups of patients undergoing cancer chemotherapy.

Education & Communication

Patients undergoing cancer chemotherapy face significant challenges and uncertainty. Detailed knowledge is required to support self care and self management and is presumed to reduce psychological distress⁴² and play a part in managing other symptoms such as nausea and vomiting⁴³⁻⁴⁴ and pain⁴⁵⁻⁴⁶. While studies on the effect of information giving and communication in these areas are somewhat equivocal, the provision of accurate information and skilled communication is intrinsically important and makes a major contribution to the quality of patient experience⁴⁷. Although we identified a systematic review of communication skills training, the reported outcomes were professional behaviours⁴⁸. Although changes in nurses' communications with simulated patients were identified, the significance of this for patients is unclear⁴⁸. We found no reviews which measured the impact of variation in training in communication skills among nurses on patient knowledge or satisfaction with communication. However, a number of interventions intended to impact upon other nurse sensitive outcomes are meant to do so via the mechanism of knowledge and/or rely on effective communication skills. In so far as these are supported by evidence the impact upon knowledge can be presumed and has been demonstrated in some cases (e.g.⁴⁶)

Individual trials of interventions designed to improve communication skills among nurses⁴⁹ and a nurse delivered patient information support service⁵⁰ did not lead to improved outcomes (perceived communication quality or satisfaction with knowledge) but in neither case was it clear that the intervention was successfully implemented.

Conclusion: Probably an important component of nursing intervention in a range of areas and related to overall service quality

There is a presumed patient benefit from a high quality nursing service because a quality service will be more likely than a low quality service to identify patient need (through communication skills) and deliver appropriate information successfully. The outcome is an important one which is closely linked to delivering quality care in a number of areas and it is relevant to the management of many patients undergoing cancer chemotherapy. However it may best be regarded as a process indicator, on the pathway to a number of important outcomes, and as an element of experience (see below).

Experience

The experiences that patients have of care are important and represent an essential component of quality. Patient experiences of care are also strong indicators of quality care⁵¹ and it is clear that there has been significant variation in the quality of patient experience of cancer chemotherapy nursing in the past⁴⁷. However, we did not find evidence for nursing interventions or aspects of service quality which were clearly associated with variation in the patient experience in ambulatory chemotherapy settings, although satisfaction is often used as an outcome in nursing intervention studies. A single

US study compared patient reported outcomes, including satisfaction with care, for 270 patients cared for by either nurses with a specialist certification in oncology or non certified nurses across several settings including ambulatory settings⁵². No differences were found in levels of satisfaction associated with certification but the power of the study was low, the period of follow up unclear and the design (observational) weak. While the literature seems to focus on summary ratings of satisfaction, as opposed to specific reports of experience, it seems that provision of information and quality of communication are areas of common concern for patients⁴⁷. More generally, issues of confidence and trust in nursing staff have been highlighted as important aspects of patient experience⁵³.

Conclusion: Likely sensitive to nursing intervention and overall service quality

The intrinsic nature of experience as both an aspect and an indicator of quality means that despite the absence of clear evidence about what nurses do to generate positive (or negative) patient experiences, it should be regarded as an indicator of quality that will vary with the quality of nursing care. The literature reviewed suggests, but does not clearly identify, from the patient's point of view, what aspects of experience matter most. The outcome is an important one and it is specifically associated with the management of all patients undergoing cancer chemotherapy.

Fatigue

Fatigue is a nearly universal experience among patients undergoing cytotoxic chemotherapy although specific causes are poorly understood⁵⁴, probably because so many factors converge for the patient undergoing treatment for cancer. Factors leading to fatigue include direct effects of the tumour, treatment side effects, co-morbid conditions, co-morbid symptoms and psychological strain. There is some evidence (grade B/C) from reviews, including high quality systematic reviews, supporting exercise, psychosocial interventions and drug therapy (for patients with anaemia)⁵⁴⁻⁵⁹. The actual or potential involvement of nurses in delivering psychosocial interventions is high but these do not form part of routine care, instead comprising additional sessions over a short (10 minutes) to long (3 hours) duration and delivered over a number of weeks.

Conclusion: Possibly sensitive to nursing intervention and overall service quality

There is an assumed patient benefit from a high quality nursing service because a quality service will be more likely than a low quality service to identify the patient problem through assessment and ensure that recommended therapies are prescribed. There is a potential direct effect from nurse delivered non-pharmacological therapies but these are unlikely to form part of routine care and would require dedicated provision. The outcome is an important one and it is specifically associated with the management of most patients undergoing cancer chemotherapy.

Nausea & Vomiting

Nausea and vomiting is a common and distressing symptom associated with most chemotherapy regimens. Although the effectiveness of drug treatments is well established⁴³⁻⁴⁴ (1A) the benefits of other modalities and the contribution of nursing is not, although a number of potential nursing interventions are supported by grade 1-2 B/C recommendations. These include pre-assessment, targeted screening, structured follow up⁴³, and interventions such as acupuncture, acupressure guided imagery, music, progressive muscle relaxation, support and information^{43 60}. Generally, careful assessment, matching preventative regimes to likely need (1B) and provision of dietary advice (2C) may have an impact upon the outcome.

A single US study compared patient reported nausea for 270 patients cared for by either nurses with a specialist certification in oncology or non certified nurses across several settings including ambulatory settings⁵². No differences were found associated with certification of nurses but the power of the study was low, the period of follow up unclear and the design (observational) weak. A multi centre observational (pre-post) study of 249 chemotherapy patients found some evidence (grade C) of improvement in nausea and vomiting from the implementation of an evidence based clinical practice protocol identifying interventions for nurses combined with structured symptom assessment⁶¹.

Conclusion: Likely sensitive to nursing intervention and overall service quality

There is evidence to suggest patient benefit from a high quality nursing service because a quality service will be more likely than a low quality service to identify the patient problem through assessment and ensure that recommended therapies are prescribed. There is a potential direct effect from nurse delivered non-pharmacological therapies which could form part of routine practice, including provision of advice on self care. The outcome is an important one and it is specifically associated with the management of most patients undergoing cancer chemotherapy.

Nutrition

Patients with cancer often present with anorexia and weight loss due to the disease process and may subsequently suffer further challenges due to treatment side effects. In relation to ambulatory chemotherapy treatment, induced nausea and vomiting are key contributing factors⁶². We found no strong evidence to support the sensitivity of this outcome to nursing. There is some evidence from a good quality systematic review to support the use of appetite stimulant drugs for people with cancer⁶³ (grade B). A review of interventions including nutritional supplementation and counselling provided limited evidence of improved nutrition and wellbeing⁶² (grade B/C).

Conclusion: Possibly sensitive to nursing intervention and overall service quality

There is an assumed patient benefit from a high quality nursing service because a quality service will be more likely than a low quality service to identify the patient problem through assessment and ensure that recommended therapies are prescribed and appropriate advice and support given. However, the effectiveness of these treatments is supported by only modest evidence. The outcome is an important one and it is specifically associated with the management of many patients undergoing cancer chemotherapy.

Oral Mucositis

Oral mucositis is a common and potentially debilitating side effect from many common chemotherapy regimes. It is associated with significant adverse outcomes such as infection and death⁴¹. Good oral care and client education is recommended and seen as a core part of the nursing role although precise protocols vary hugely and strong evidence of effect is lacking (Grade 1/2C)⁴¹. There are a number of potentially effective agents for treating mucositis but evidence is weak and of poor quality (Grade B)⁶⁴. There is stronger (but variable) evidence for preventative interventions likely to be nurse led or based on advice from nurses, including the use of; honey (grade B), ice chips (grade A), and oral care (grade B).

A multi centre observational (pre-post) study of 249 patients undergoing chemotherapy found some evidence (grade C) of improvement in oral symptoms from the

implementation of an evidence based clinical practice protocol identifying interventions to be delivered by nurses combined with a structured symptom assessment⁶¹.

Conclusion: Probably sensitive to nursing intervention and overall service quality

There is potential patient benefit from a high quality nursing service because a quality service will be more likely than a low quality service to identify the patient problem through assessment and ensure that recommended preventative actions are taken. There is a potential direct effect from nurse delivered non-pharmacological therapies which could form part of routine practice, including provision of advice on self care. The outcome is an important one and it is specifically associated with the management of some groups of patients undergoing cancer chemotherapy.

Pain

Pain is a common and debilitating symptom associated with cancer although estimates of its prevalence in the population as a whole vary greatly with little data available on incidence⁵⁵⁻⁶⁵. Given that many patients undergoing cancer chemotherapy may be asymptomatic, having had tumours detected via screening programmes, or not had pain as a presenting symptom⁶⁵ it is likely that the prevalence is lower in this population than the general population of people with cancer. Apart from local discomfort it is not a treatment side effect although pain progression or reduction may be an indicator of treatment effectiveness. There is a substantial literature on approaches to pharmacological management of pain and many guidelines⁶⁶ which are recommended for practice (level 1) but management of pain is often suboptimal⁶⁵. There is evidence from a number of trials and observational studies that use of such guidelines results in reduced levels of pain for patients (e.g. ⁶⁷⁻⁶⁸ tentative assessment of evidence level A/B) but we could find no high quality systematic reviews of guideline implementation. Patient training and information giving is also recommended (Level 1) and associated with improved pain management in several trials and a systematic review⁴⁵⁻⁴⁶ although results are not consistent (grade B). There is also evidence (grade B) from a systematic review to support psychological interventions such as guided imagery⁴⁵.

A single US study compared patient reported levels of pain for 270 patients cared for by either nurses with a specialist certification in oncology or non certified nurses across several settings including ambulatory settings⁵². No differences were found associated with certification of nurses but the power of the study was low, the period of follow up unclear and the design (observational) weak.

Conclusion: Possibly sensitive to nursing intervention and overall service quality

There is evidence to suggest patient benefit from a high quality nursing service because a quality service will be more likely than a low quality service to identify the patient problem through assessment and ensure that recommended therapies are prescribed. There is a potential direct effect from nurse delivered non-pharmacological therapies which could form part of routine practice, including provision of advice on self care. The outcome is an important one but it is not specifically associated with the management of cancer chemotherapy.

Safe medication administration

The administration of medication is a high risk activity and drug errors are common⁶⁹. When the medications being administered are cytotoxic the risk of harm is particularly high. While drug errors are primarily related to systems failures, nurses have a role in detection and prevention before harm is done to the patient⁶⁹. Furthermore, the administration process itself is risky requiring skilled assessment of patient fitness and patency of intravenous access⁶⁹. Patient education is a key challenge for patients receiving

oral medication where a lack of concordance poses a significant risk⁷⁰. Many of the potential impacts of nursing relate to assessment of toxicities⁶⁹ and are reflected in other outcomes considered in this review (e.g. nausea and vomiting, mucositis, septicaemia). Administration of vesicant drugs poses a significant risk associated with many commonly used drugs⁷¹. We found no specific evidence from reviews relating to nursing interventions or approaches to increase safety in ambulatory chemotherapy but there are strong expert recommendations⁷⁰⁻⁷² (level 1 C) and evidence based recommendations on intravenous drug administration from general settings (level 1 A/B) relating to the safe administration of medication which points to diverse aspects of assessment (including fitness to receive drugs) and technique (including prevention of infection and the treatment and prevention of injury from vesicant drugs) which fall within the scope of nursing practice. Evaluation (before and after) of a multifaceted nurse led programme designed to increase the quality of care related to chemotherapy related toxicities⁷³, showed sub optimal care processes at initiation of the project and resulted in improvements in those processes but did not report patient outcomes.

Conclusion: Probably sensitive to nursing intervention and overall service quality

There is presumed patient benefit from a high quality nursing service because a quality service will be more likely than a low quality service to properly assess and reduce errors and adverse reactions and ensure that recommended preventative actions are taken. A high quality service is also more likely to identify and remedy contributing factors. There is a potential direct effect from nursing technique (hygiene, assessment and correct use/placement of devices) which form part of routine practice. The outcomes are important ones and specifically associated with the management of all patients undergoing cancer chemotherapy. Many outcomes related to toxicities and infection are reflected in other outcome areas but direct administration errors and injury resulting from vesicant drugs are specific outcomes.

Septicaemia/febrile neutropaenia

Febrile neutropaenia is a common and life threatening complication of many chemotherapy regimens⁷⁴⁻⁷⁵. Delays in treatment and reductions in dose are common, resulting in reduced treatment effectiveness⁷⁵. There is a role for chemo-prophylaxis⁷⁵ and (clearly) treatment with antibiotics. However, much emphasis is placed on patient education, self care and appropriate support and assessment⁷⁵. Preventative actions by patients are believed to impact on rates of infection but specifics of appropriate advice are contested⁷⁶ (level 2 C). The provision of telephone support, including dedicated help lines (generally by nurses) is common⁷⁵, but we could find no reports of the impact of these on outcomes. There is considerable uncertainty around the appropriate content for self care advice⁷⁶. However, there is evidence of variation in both practice and in outcomes^{2,76}. Early self referral when experiencing symptoms is a key action believed to impact on outcomes⁷⁵.

Conclusion: Possibly sensitive to nursing intervention and overall service quality

There is an assumed patient benefit from a high quality nursing service because a quality service will be more likely than a low quality service to reduce risk, educate patients appropriately, provide referral guidance and support and ensure that recommended therapies are prescribed and appropriate advice and support given. However, the appropriate advice and support mechanisms remain uncertain. The outcome is an important one and it is specifically associated with the management of many patients undergoing cancer chemotherapy.

Wellbeing & Function

A sense of wellbeing and the ability to perform normal activities and roles are severely challenged by both direct consequences of cancer, the psychological sequelae of diagnosis and the physical and psychological impact of treatments, including the side effects of cancer chemotherapy. Prevalence of major depression may be as high as 42% among people with cancer⁵⁵ although there is huge variation in estimates. Much of the variation in functional outcomes for individuals is likely to be mediated by psychological wellbeing and by the impact of side effects considered individually elsewhere in this report. The frequent suggestion of benefit of psycho-educational interventions for diverse symptoms such as fatigue, nausea and pain clearly suggests that the causal pathway is complex. Sleep disturbance is also heavily implicated in the complex causal pathway⁷⁷⁻⁷⁸. We could find no studies specifically addressing nursing interventions to support physical or role function. Guidelines⁴² support screening for distress, education, counselling and identifying those in need of onward referral as interventions (Grade 1 B/C) all of which could be delivered by nurses in the ambulatory chemotherapy setting, but the evidence base is modest or weak. A systematic review⁷⁹ identified evidence for benefits from cognitive behaviour therapy for depression and anxiety (grade A). A review of interventions for sleep disturbance suggest that mindfulness based stress reduction techniques and expressive writing may have some benefit on sleep in diverse groups of people with cancer but no evidence derives from those receiving current chemotherapy (grade B).

Individual trials of interventions designed to improve communication skills among nurses⁴⁹ and a nurse delivered patient information support service⁵⁰ did not lead to reductions in patients' expressed wellbeing but in neither case was it clear that the intervention was successfully implemented.

Conclusion: Possibly sensitive to nursing intervention and overall service quality

There is presumed patient benefit from a high quality nursing service because a quality service will be more likely than a low quality service to identify patient problems through assessment and ensure that recommended preventative actions are taken. A high quality service is also more likely to identify and remedy contributing factors including specific side effects such as nausea and vomiting. There is a potential direct effect from nurse delivered non-pharmacological therapies which could form part of routine practice. The outcome is an important one and it is specifically associated with the management of all patients undergoing cancer chemotherapy.

Consensus exercises

Twenty nine of the people attending the workshops at NDP completed assessments of the relative importance of the outcome areas. Participants were given the opportunity to note significant omissions but no outcomes were added to the list as a result of the exercise. The most highly ranked area as a useful measure of quality was safe medication administration. This was also rated as important to patients (3rd). Septicaemia (2nd), experience (3rd), and education and communication (4th) were also ranked as useful measures (see table 4). Of these all were also ranked highly as important to patients – except septicaemia. Comments made during the exercise suggested this was ranked as a low priority for patients because professionals believed patients were relatively unaware of the risk. Our reference group concurred with this view and supported the rankings for measures of quality.

Table 4 – Summary of consensus and evidence assessments

Outcome	Most useful measure of quality? (rank of scores)	Most important to patients? (rank of scores)	Rank in literature	Recommendation/ evidence	Assessment of sensitivity to nursing
Safe Medication Administration	1	3	(2)	1C	Probable
Septicaemia	2	7	(10)	2C	Possible
Experience	3	1	(8)	–	Likely
Education and Communication	4	2	(4)	1B	Probable
Wellbeing and Function	5	6	(1)	1B/C	Possible
Nausea and Vomiting	6	4	(9)	1A/B	Likely
Pain	7	5	(3)	1A/B	Possible
Diarrhoea	8	9	(5)	1A/B	Possible
Fatigue	9	8	(6)	B/C	Possible
Oral Mucositis	10	10	(7)	1ABC	Probable
Nutrition	11	10	(11)	B/C	Possible

* Specific evidence and recommendations relating to communication are linked to other outcomes. The evidence lead us to conclude that this was a process that could be considered under other headings including experience

Discussion & conclusions

We found a large number of suggested areas which might be indicators of quality nursing care in ambulatory chemotherapy including a wide range of outcomes. However, the evidence to support a link between nursing and outcomes was often relatively weak. In some cases where we found evidence and strong recommendations, the precise nursing role in achieving the outcome was unclear.

The outcomes identified and evidence reviewed suggest that the clearest direct impact of nurses in ambulatory chemotherapy is likely to be on the safety and experience dimensions of quality. The impact on treatment effectiveness is indirect and mediated by their ability to support patients in managing the toxicities of treatment. The nursing contribution was often based upon a presumed link between accurate problem identification and provision of access to therapies (some nurse delivered, some not) with modest evidence of benefit.

While we have not assessed evidence for all possible indicators on our long list, we have assessed those where the claims for sensitivity to nursing could be said to be strongest, based on the frequency they appeared in our sources. Although this ranking was somewhat arbitrary and is influenced by the degree to which a heading encompasses broad topics as opposed to specific outcomes, there was a general agreement among our reference group and consensus exercise that these were the most important topics. We did not identify any detailed specifications for quality indicators that could immediately be deployed.

We focussed our search for evidence of nurses' impact upon outcomes, but our search strategy and selection criteria included studies that examined processes, structures and workforce factors, some of which were suggested as possible indicators by our search at stage 1. No strong evidence was found that supported any of these factors as being linked to outcomes and therefore we could not recommend any of these as indicators of quality supported by evidence. Furthermore the absence of existing developed indicator sets

made formal evaluation of indicators against established criteria of importance, scientific acceptability, usability or feasibility impossible. However, this state of affairs highlights the need and urgency for moving forward and developing a parsimonious set of indicators so that evidence can be gathered.

In many cases, the degree of sensitivity to nursing would depend upon the precise roles nurses fulfil within a setting. For example, if nurses act as independent prescribers for treatments of toxicities then patient outcomes are likely to be more dependent on the input of nurses than if they are not. If nurses were not administering intravenous medications then many aspects of safe medication administration we identified would not be 'nurse sensitive' at all. Conversely we have not considered evidence of outcomes that may reflect and be sensitive to care from the wider clinical team who provide supportive care for patients undergoing cancer chemotherapy. Under some circumstances this support (for example nutritional support) could be primarily provided by nurses. In drawing up our recommendations for indicators we have focussed on those supported by sensitivity to nursing, but readily acknowledge that other professions contribute to these outcomes to a greater or lesser extent. Given the potential for changing roles and varied configurations of care delivery, there may be future scope to develop a broader set of indicators for the outcomes of supportive care (as opposed to treatment outcomes).

'Communication and education' was strongly supported as an outcome area in our consensus exercises. Communication and the provision of information about a range of aspects of care are clearly crucial. Incorporating an assessment of the outcomes of information provision and communication in terms of objective knowledge into routine measurement is challenging and does not, on the face of it, seem a profitable avenue to explore. We concluded that predominantly communication was a process which is on the pathway to a number of desired outcomes, including good experiences of care. Although we would not dispute its intrinsic importance, it is patient experience not objective knowledge that is the priority for measurement here.

The outcome domain of 'wellbeing and function' is a complex one and is clearly mediated by many factors including a number of the other outcome domains we considered, particularly toxicities. Septicaemia was strongly identified throughout this review but the evidence reviewed presented considerable uncertainty about the precise nursing contribution or an outcome that would be sensitive to it. Admissions for, or deaths from, septicaemia provide potential indicators (if risk adjustment could be accomplished) but admissions are a problematic indicator (since precautionary admission could represent good practice) and death would not be primarily nurse sensitive. Clearly though death from septicaemia is potentially an important marker of overall service quality if it could be adequately risk adjusted. Patient familiarity and confidence in having knowledge of necessary self care actions to ensure rapid presentation for assessment could be addressed through questions about experience.

Recommendations

Our work to date has enabled us to arrive at recommendations on the domains that might be developed into nurse sensitive indicators. To fully reflect the broad contribution of nurses it seems essential to select indicators for at least one outcome related to each of the three domains of 'safety, effectiveness and experience'; we recommend that initial developments of outcome indicators focus on the following areas which are identified as important and supported by sufficient evidence.

1. Safe medication administration (safety). This is clearly of extremely high priority and there are aspects which seem probably sensitive to nursing quality although specific

evidence is somewhat lacking. Specifically we recommend the development of indicators based on rates of extravasation/infiltration and/or associated injuries. Drug administration errors should also be considered.

2. Nausea and vomiting (effectiveness). We recommend that any pilot system begins with a small number of indicators so that the feasibility and usability of the information gathered can be formally assessed. Thus while a number of toxicities were on our short list we felt that initial developments should consider only one. Overall the scientific evidence of nurse sensitivity for some treatment toxicities is not strong but the management of nausea and vomiting appears to be a good candidate. We recognise that from a patient perspective the extent to which a symptom is rated as bothersome is as important, if not more so, than the summary rating of severity⁸⁰. However, it seems likely that these two strongly interact and our evidence suggests that nurses can have a positive impact on the severity of symptoms which clearly is an important mechanism for reducing patient distress. Thus we suggest indicators should be based on the number of patients reporting severe nausea and vomiting.
3. Experience. Exploration and monitoring of elements of patient experience provide opportunities to explore a range of areas including aspects of knowledge and confidence in accessing services and taking preventative advice. We suggest considering indicators covering patient experience in some or all of the following areas:
 - i. Confidence and trust
 - ii. Communication
 - iii. Ability to get answers to questions
 - iv. Information about appropriate self care

We have made some tentative suggestions for specific indicators of safety and effectiveness (see appendix 5). Below we identify a number of issues and make further recommendations that should guide future developments.

To enable comparison between provider units, outcomes need to be adjusted for risk. Linkage to the minimum dataset should facilitate this.

A number of issues arise for the development of the indicators into a practical system for implementation. Risk adjustment is a significant challenge for some of the possible indicators, particularly where outcomes are measured (nausea and vomiting). Large datasets are generally required to do this fully but, since much is known about the relative toxicity of chemotherapy regimens, linking the nurse sensitive indicator set to the proposed minimum dataset for cancer chemotherapy would open up a significant opportunity for making rapid progress. Without this linkage, risk adjustment and hence comparison between provider units, does not seem feasible in the short term.

Consideration needs to be given to existing systems for patient self assessment of toxicity in order to avoid duplication of effort. Existing systems may need to be modified.

The assessment of much toxicity relies heavily on patient self report and thus it seems reasonable and sensible to use patient reported severity as the outcome indicator. There are many scales available to assess symptoms among people undergoing treatment for cancer⁸¹ but no one instrument can claim superiority. We have based our recommendations for patient self report assessment on a simple instrument designed for

patient self report in the UK (C SAS)⁸⁰ which we believe is widely used and therefore most likely to dovetail with current practice. Any system which took this approach to measuring symptoms could easily be expanded to include other symptoms and toxicities if the full C-SAS scale was used. However, we would caution against collating and reporting large numbers of items from this scale as routine quality measures, since the sensitivity of most items to nursing intervention is far from clear. However, practice is likely to vary and this is likely to present a problem for implementing any system in settings where an alternative existing instrument is used.

There should be a clear strategy for integrating any developing system with current or emerging technology platforms.

Current practices will be documented through a variety of paper and electronic formats. At the same time there is a rapid development of electronic patient records. In the long run a parallel system that involves duplication of data collection and sits outside other record keeping systems is less likely to justify itself in terms of benefits returned to practice and is less likely to become a mainstream feature. While the system may need to be designed outside of existing platforms because of the rapid pace of development and current variation, the programme for development needs to include a strategy to deliver a feasible solution that is, as far as possible, integrated with other systems of data gathering, documentation and record keeping, particularly electronic ones.

Patients need to be involved in developing patient experience indicators although the Care Quality Commission's patient surveys provide items that are useful starting points.

In our previous report on metrics⁶ we identified the importance of involving patients in identifying important aspects of experience that should be assessed. Some important issues have been raised in this review which could act as a focus. The Care Quality Commission's patient surveys⁸² provide items that may provide useful starting points for example:

*When you had important questions to ask a nurse, did you get answers that you could understand?
Did you have confidence and trust in the nurses treating you?
Did nurses talk in front of you as if you weren't there?*

Questions such as these on patient experience could be supplemented by more specific items relating to advice given about actions in the event of febrile neutropaenia such as:

Are you confident that you know what to do if you begin to feel unwell between treatments?

The best method of recording serial patient experiences is unclear in this context. While it is likely that maximum response could be achieved by collecting data during visits for treatment, there are limitations. For example, patients may not feel able to respond frankly and may be unhappy answering the same questions repeatedly, especially if experiences are not good. Real time patient experience tracking technology might provide a mechanism for data capture but would not resolve the issues of repeated questioning. It

will be important to consult with patients in the development of any indicators and approaches to collecting the data.

Data on contextual factors should be gathered alongside the quality indicators.

Although we did not identify any evidence that would allow factors such as staffing level or training to be considered as direct quality indicators these factors are heavily implicated in variations in quality in other settings. We would recommend that any system developed incorporated measures and reports of contextual factors including:

Level of nurse staffing (matched to activity)

Specialist qualifications of nurses

Skill mix in the nursing team

Organisation of care

Staff well being

Provision / level of specialist support from professions allied to medicine

Levels of support / staffing from other professional groups

Conclusions

The work described here represents a first stage to support realization of an ambition to develop and implement a system to measure outcomes associated with nursing care in the context of ambulatory chemotherapy. It revealed that although the evidence was not strong there was a clear indication that some outcomes may indeed be sensitive to nursing care. Precisely because of this lack of evidence the development of the indicator set should now proceed with some urgency. Only through establishing a system of regular measurement of outcomes will it be possible to begin to understand the impact of variation in nursing on the quality of care. We found no existing well evaluated sets of indicators but identified the development of indicators for safe medication administration, nausea and vomiting and patient experience as strong candidates for incorporation into a future pilot system. Considerable challenges now lie ahead in terms of arriving at precise definitions for the selected indicators, the best means of risk adjustment and development of robust and feasible systems for data collection. The likely lack of standardisation with respect to what and how data are currently recorded and the proliferation of paper based systems (including patient self assessment questionnaires) will pose significant obstacles. It will be important as this initiative moves forward to consider emerging (and existing) technology platforms for data capture to capitalise on the philosophy of 'collect once use many times'. It will also be important to ensure links are made between this work and work to develop a minimum data set for chemotherapy and so contribute to establishing a coherent suite of indicators that relate to the quality and safety and effectiveness of cancer care that fully reflects the contributions made by the different members of the cancer care team.

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Appendices

Appendix 1: Search strategies and web sources searched

Stage 1 search strategies to identify indicator systems and potential nurse sensitive outcomes

Key web sites searched

Source	Type	Date Accessed	Result/Findings
American Academy of Nursing www.aannet.org	Website		<ul style="list-style-type: none"> Quality of Care initiative sets out some patient outcomes – not much detail Works with the NQF Referenced in the White Paper produced by the ONS
American Nurses Association www.nursingworld.org	Website	17/06/09	<ul style="list-style-type: none"> Developed the National Database of Nursing Quality Indicators – NDNQI Many indicators are National Quality Forum endorsed measures Shown on OUTCOMES table
European Oncology Nursing Society www.cancernurse.eu/education/clinical_guidelines.html	Website	04/08/09	Provided guidelines for extravasation, neutropaenia, oral mucositis and anaemia.
International Council of Nurses www.icn.ch/matters_indicators.htm	Website	17/06/09	<ul style="list-style-type: none"> Factsheet gives definitions of outcomes & indicators. Suggests 4 pt outcomes commonly used; pt complications/exploratory measures/surgical pt complications/pt length of stay & failure to rescue. Gives portion of list of pt outcomes which are listed on the OUTCOMES table
Multinational Association of Supportive Care in Cancer www.mascc.org/mc/page.do?sitePagelId=86907&orgId=mascc	Website	17/7/09	Most recently updated guidelines for prevention and treatment of Mucositis – is multinational based so may not be definite to UK practice.
National Quality Forum www.qualityforum.org/publications/browse.asp	Website	17/06/09	<ul style="list-style-type: none"> National Quality Forum looks at pt centred/nurse centred & system centred measures Does have section on ambulatory care but it is for physicians & specific pathologies – may be of use for a closer look?
NHS The Information Centre Indicators for quality improvement www.ic.nhs.uk/services/measuring-for-quality-improvement	Website	13/7/09	Number of relevant indicators – not all clear but many do lend support to the current indicators highlighted in cancer research
American Nurses' Association www.nursingworld.org www.nursingworld.org/MainMenuCategories/ThePracticeofProfessionalNursing/PatientSafetyQuality/Research-Measurement/The-National-Database/NDNQIBrochure.aspx	Website		<ul style="list-style-type: none"> Patient falls Nosocomial infections Central line associated blood stream infections Most evidence seems to be from the 1990s and early 000's. <p>However, the outcomes on the left are all also listed as NQF indicators.</p> <ul style="list-style-type: none"> Staff mix Nursing hours per patient day Nurse turnover
Oncology Nursing Society www.ons.org	Website	14/7/09	The ONS website is home to numerous evidence-based guidelines for nursing-sensitive patient outcomes measures which have helped populate the evidence table for the following topics; Anxiety, caregiver strain & burden, chemo induced peripheral neuropathy, constipation, depression, dyspnoea, fatigue, infections, mucositis, nausea & vomiting, nutritional status, pain, return to usual function, sleep-wake disturbances.

Database/web searches

11/06/09	Ovid Medline	Cancer/Nurs\$/Metrics/Outcomes
		Cancer/Metrics
		Cancer/metrics/outcome
		Cancer/nurse/metrics
17/06/09	Google	Nurse sensitive outcomes
17/06/09	American Nurses Association	Nursing sensitive outcomes
17/06/09	Ovid Medline	Nursing-sensitive patient outcomes
		Nurse sensitive patient outcomes/oncology/cancer
		Cancer/oncology/quality of life/ outcome assessment/patient outcomes/outcomes and processes/Nursing/nurses/nurse
		Cancer/oncology/quality of life/ outcome assessment/patient outcomes/outcomes and processes/Nursing/nurses/nurs+ sensitive
		Cancer/oncology/quality of life/ outcome assessment/patient outcomes/outcomes and processes/Nursing/nurses/nurse+ metrics
		Cancer/oncology/quality of life/ outcome assessment/patient outcomes/outcomes and processes/Nursing/nurses/nurse+ indicators
		Cancer/oncology/quality of life/ outcome assessment/patient outcomes/outcomes and processes/Nursing/nurses/nurse+ measures
23/06/09	Medline	Quality of life/ caner/oncology/ nurse/nursing/nurses/
23/06/09	British Nursing Index and Archive	Nursing-sensitive patient outcomes
		Quality of life/cancer/ oncology/nurse/s/ing
		Quality of life/cancer/oncology/ nurse/nursing/nurses/+ sensitive
23/06/09	Embase	Nursing-sensitive patient outcomes
		Nurse sensitive patient outcomes
		Nurse/s/ing/quality of life/ quality indicators
		Nurse/s/ing/ cancer/oncology/ quality of life
23/06/09	Oncology Nursing Society (ONS)	Nurse sensitive patient outcomes
23/06/09	American Academy of Nursing	
03/07/09	Medline	Cancer/oncology AND Nurse AND Metrics OR Quality Indicators (in healthcare) OR Outcomes OR Quality Or Sensitive Outcomes AND Outpatients OR Chemotherapy OR Ambulatory (care facilities)
03/07/09	Medline	Cancer/oncology AND Nurse AND Metrics OR Quality Indicators (in healthcare) OR Outcomes OR Quality Or Sensitive Outcomes
14/07/09	ONS	Quality Indicators
		Oncology quality indicators
		Ambulatory quality indicators
		Ambulatory chemotherapy quality indicators
		Nursing-Sensitive Patient Outcomes

Example search strategies for stage 2

Cochrane Library

#1	(nausea):ti,ab,kw or (vomiting):ti,ab,kw in Cochrane Reviews and Other Reviews
#2	(cancer):ti,ab,kw or (oncology):ti,ab,kw in Cochrane Reviews and Other Reviews
#3	(#1 AND #2)
#4	(chemotherapy):ti,ab,kw in Cochrane Reviews and Other Reviews
#5	(#3 AND #4)
#6	(nurse) or (nurs*) in Cochrane Reviews and Other Reviews
#7	MeSH descriptor Nurses explode all trees
#8	(#6 OR #7)
#9	(#5 AND #8)

Ovid MEDLINE(R) 1950 to October Week 3 2009

1	exp Nausea/ or nausea.mp.
2	exp Vomiting/ or vomiting.mp.
3	1 or 2
4	exp Nurses/
5	(nurse or nurses or nursing*).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]
6	4 or 5
7	"Personnel Staffing and Scheduling"/ or staffing.mp.
8	skill mix.mp.
9	Clinical Competence/
10	competence.mp.
11	exp Total Quality Management/ or quality.mp. or exp Quality Assurance, Health Care/
12	organisation.mp.
13	organization.mp.
14	organizational.mp.
15	exp Training Support/ or training.mp. or exp Inservice Training/
16	Education/
17	education\$.mp.
18	exp Leadership/
19	leadership\$.mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]
20	skills.mp.
21	or/7-20
22	21 and 6
23	cancer.mp.
24	exp Oncology Service, Hospital/ or oncology.mp. or exp Medical Oncology/
25	23 OR 24
26	22 and 25
27	3 and 26

Appendix 2: Potential quality outcome dimensions and indicators

Key

I = Inferred Indicator

E = Explicit Indicator

Outcomes	Example indicator areas	I/E
Anaemia ^{1,2}	Assessment for related symptoms ²	E
Cardiac toxicity	Assessment using validated tool ³	E
Constipation ^{4,7}	Assessment of bowel habits using validated tools ⁸	E
	Constipation ^{4,7}	I
	Dietary assessment ⁵	I
Diarrhoea ^{1,4,7}	Altered mucous membranes ³⁻⁵	E
	Assessment of bowel habits using validated tool ⁸	E
	Diarrhoea ^{1,4,7}	I
Dyspnoea ^{4-6,9}	Assessment of dyspnoea using validated tools ^{6,8,10}	E
	Dyspnoea ⁴⁻⁶	I
	Patient education for managing dyspnoea ⁶	I
	Patient support for managing dyspnoea ⁶	I
Fatigue ⁴⁻⁶	Ability to undertake ADLs ^{4-5,11,12}	E
	Assessment of fatigue using validated tool ^{6,10}	I
Fertility ³	Fertility counselling	I
Hypertension ³	Assessment of BP ³	E
Hypersensitivity reactions ⁴⁻⁵	Rash ³	E
(Oral) Mucositis ^{4,6,13}	Assessment for infection (fungal/herpes) ¹³	E
	Assessment of nutritional status (weight loss/anorexia/ malnutrition/ dehydration) ^{6,7,10}	I/E
	Assessment of oral cavity regularly using validated tools ^{6,13}	E
	Clear and regular documentation ⁶	E
	Has pt been told to use soft bristle toothbrush & replace it regularly ^{9,6,14}	I/E
	Infection	I
	Nutritional Status ^{5-7,10}	E
	Patient education about specifics of oral hygiene in mucositis ^{6,13}	I/E
	Patient education about the use of oral care protocols ¹³⁻¹⁴	I/E
	Referral to dental professional ^{6,14}	I/E
Nausea & Vomiting ^{1,4-6,9}	Assessment – frequency/intensity	E
	Counselling anxious patients ⁶	E
	Frequency/intensity of nausea (pt report) ⁴	
	Nutritional assessment ⁷	
	Prescription of appropriate antiemetic regime ⁵	I
	Pt education ⁶	E
	Regular assessment and documentation using validated tools (self-reporting where possible) ⁶	I
Septicaemia	Assessment for signs of infection ¹⁵	E
	Avoidance of permanent or semi permanent catheters	E
	Early identification ^{3,15}	E
	Febrile neutropaenia ^{3-6,15}	E
	Frequent oral care (tooth brushing & gentle flossing as tolerated) ^{6,15}	E

	(Oral) Mucositis ^{4 6 13}	
	Patient education ^{3 15}	E
Pain ^{4-6 8 16}	Assessment of pain using validated tools ⁹	E
	Education interventions ⁶	I/E
	Level of pain assessed using validated tools ^{1 6 8 17}	I
	Patient comfort level ^{7 18-19}	
	Referrals to other services such as massage providing short term relief ⁶	E
Peripheral Neuropathy (chemotherapy induced) ^{4 6}	Hand and foot syndrome (Palmar-Plantar Erythrodysesthesia) ³	E
	Regular assessment of physical condition monitoring of symptoms ⁹	I
	Routine assessment of stance, gait & balance ⁵	I
Skin ulcer ^{5 11-12}	Skin ulcer ^{5 11-12}	E
Sleep disturbances/Insomnia ⁴⁻⁵	Sleep disturbances/ Insomnia ⁴⁻⁵	E
Nutrition ⁷	Assessment from first point of contact and then ongoing using validated tool ^{6 10}	E/I
	Cachexia ¹⁰	I
	Care plan developed from point of contact ⁵	E
	Malnourished ^{5 10}	I
	Nutritional counselling ¹⁰	I
	Oral mucositis ¹³	E
Experience	Control of treatment choices ⁹	I
	Patient choice about place of treatment ³	
	Patient feel there is trusted relationship with staff ²⁰⁻²¹	I
	Patient satisfied with way staff communicate to them ¹⁹⁻²⁰	E
	Patient confidence in staff ²⁰	E33
	Patient involvement in care and treatment ¹⁹	E
	Patient knows contacts (emergency & other) during chemo ^{3 19}	E/I
	Patient satisfaction with technical care ^{3 18-19}	E
	Patient satisfaction with nurse management – symptom management, information giving & support ^{3 21-22}	E
	Patients wait time (wait for treatment) ^{3 19 23}	E/I
	Support at home available ³	E
Education & Communication	Emergency support phone line manned ^{24/7 3}	E
	Family education ^{8 16 18}	I
	Patient knows contacts (emergency & other) during chemo ^{3 19}	E/I
	Patient education re: treatment/processes/side effects/what to do/febrile neutropaenia/holistic assessment/contacts – who and how ^{3 8 16 18-19 24}	I/E
	Patient satisfaction with education ²¹	E
	Staff communication with family ¹⁸	I
	Staff communication with patient ¹⁸	I
Wellbeing & Function	Ability to carry out usual activities ^{4-5 11-12}	E
	Activities of Daily Living (ADL) ^{4-5 18}	I
	(Patient) Anxiety ^{4-6 18-19}	E
	Anxiety assessment using validated tool ³	E
	Assessment of fatigue using validated tool ^{6 10}	E
	Compliance ^{3 20}	E
	Coping ^{4 7 18}	E/I
	Depression ^{4-6 10 18}	I
	Fatigue ⁴⁻⁶	
	Instrumental Activities of Daily Living (IADL) ^{4-5 18}	I

	Needle phobia assessment ³	E
	Patient-family communication ^{9,18}	I/E
	Performance status ^{3,12}	E
	Psychological counselling ⁶	E
	Quality of life ⁵⁻⁶	I
	Return to usual function ^{4,18}	I
	Routine assessment of anxiety using validated tool ^{6,8}	E
	Routine assessment of depression using validated tool ⁶	E
	Sleep disturbances/Insomnia ^{4,5}	E
	Spiritual care services available ⁸	I
	Spiritual distress ^{4-5,9}	I
Family well being	Emotional strain on family/caregiver ⁶	E
	Family education ⁶	E
	Family support ¹⁸	E
	Psychological counselling ¹⁸	E
	Routine assessment of anxiety routinely using validated tool ⁸	IE

Safety

Outcome	Indicator	I/E
Safety ¹²	Availability of hand washing facilities/hygiene	
	Cleanliness of environment ¹⁹⁻²⁰	I/E
	Nosocomial infection ²⁵	
	Patient education re: treatment/processes/side effects/what to do/febrile neutropaenia/holistic assessment/contacts – who and how ^{3,8,16,18-19,24}	I/E
	Reporting of incidents/near misses ^{22,26}	I/E
Safe medication administration	Aseptic technique used at all times for IV insertion to any site ⁶	E
	Avoidance of permanent or semi permanent catheters ⁶	E
	Barrier precautions taken when inserting central venous catheters ⁶	E
	Catheter type/size assessed for complications – type & duration of IV therapy ²⁷	E
	Catheters replaced no more frequently than 72 hours unless otherwise indicated ⁶	E
	Central line associated blood stream infection ^{22,25}	
	Cleanliness of environment ¹⁹⁻²⁰	I/E
	Clear documentation of care plan ⁶	I
	Dressings over IV sites changed promptly when soiled/damp or loosened ⁶	E
	Extravasation incidents ^{5,24,27}	E
	Insertion site assessed for possible complications ^{6,24,27}	E
	Intravenous Infection ²⁷	E
	Needle phobia assessment ³	E
	Number of central lines/IV lines	
	Number of days central lines in place ⁵	E
	Number of incidents ^{3,22}	E
	Nurse canulating to administer drug ³	E
	Nurse knowledge ^{18,24,27}	I/E
	Nurse skill ^{18,27}	I/E
	Paediatric IV infiltration rate	
Patient education re: treatment/processes/side effects/what to do/febrile neutropaenia/holistic assessment/contacts – who and how ^{3,8,16,18-19,24,27}	I/E	
Phlebitis rate ^{3,24}	E	

	Re-admission: length of stay with toxicity ^{3 5 18}	I/E
	Reporting of incidents/near misses ^{22 26}	I/E
	Safety standards for devices ^{20 24}	E
	Sclerosis of central line sites ³	E
	Septicaemia ^{3 15}	
	Vein pain ^{3 24 27}	E
	Venous assessment (specifically those on vesicants) ^{3 24}	E

Processes, structures and workforce

Outcome	Indicator	I/E
Care Delivery processes	Advocacy for pt/family ¹⁸	I
	Care planning ⁸	I
	Continuity of care ⁸	E
	Correct nursing diagnosis ¹⁸	I
	Improved documentation ^{8 18}	I
	Patients wait time (wait for treatment) ^{3 19 23}	E/I
	Referrals to resources ^{3 18-19 23}	I
	Use of guidelines/policy ^{3 24}	E
Resource Utilisation	Use of research ^{6 18}	E
	Emergency visits ^{4 20 23}	I
	Homecare Visits ⁴	I
	Out-of-pocket-costs (family) ⁴⁻⁵	I
Internal Regulations/Compliance	Re-admission: length of stay with toxicity ^{3 5 18}	I/E
	Compliance with organisations safety standards ^{20 24}	E
	Use of guidelines/policy ³	E
	Internal regulations ¹⁸	I
Workforce Resources	Safety standards for devices ^{20 24}	E
	Lack of personnel ¹⁸	I
	Nursing hours per patient/day ²¹	E
	Nurse retention ¹⁸	I
	Nurse turnover ^{23 25}	I
	Practice environment (size, space, patient comfort, privacy) ^{19 25-26}	E
	Staffing levels: number of nurses to workload ³	E
	Staff mix: Health care support worker/nurse grade/band ³	E
Waiting time for treatment ^{3 19-20}	E	
Workforce Skill & Knowledge	Nurse knowledge ^{18 24}	
	Nurse skill ¹⁸	I/E
	RN certification (level 3 training accredited course) ³	E
	RN education ³	
Workforce Wellbeing	Staff mix: Health care support worker/nurse grade/band ^{3 23 25}	E
	Job satisfaction ^{18 21 23 25}	I
	Perceived lack of time ^{3 18}	I/E
	Multiple job expectations ¹⁸	I
	Practice Environment Scale ²⁶	
	Staff communication – interdisciplinary (with each other and/or pt/family) ^{3 18}	I
	Nurse retention ¹⁸	I
Nurse turnover ^{23 25}	I	

	Staff resistance ¹⁸	
	Staff support (staff/peer/administrative) ^{18 23}	
Workforce organisation/management	Staff support (staff/peer/administrative) ^{18 23}	
	Identified lead nurse ²⁸	
	Practice Environment ²⁶	
	Team working ²⁶	
	Leadership ²⁶	

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Appendix 3: The ‘long list’ of possible quality areas

Topic	Number of sources	Priority Areas identified by reference group
Wellbeing & Function	13	**
Safe Medication Administration	12	**
Safety	9	
Care Delivery Processes	8	
Pain	8	
Education & Communication	7	*
Workforce Resources	7	
Workforce Wellbeing	7	*
Diarrhoea	6	**
Fatigue	6	
(Oral) Mucositis	6	*
Dyspnea	5	
Experience	5	
Nausea & Vomiting	5	**
Resource Utilisation	5	
Septicaemia	5	**
Workforce Skill & Knowledge	5	
Constipation	4	
Internal Regulations/Compliance	4	
Nutrition	4	*
Workforce Organisation / Management	4	
Family Well Being	3	
Hypersensitivity Reactions	3	
Peripheral Neuropathy (chemotherapy induced)	3	
Skin Ulcer	3	
Anaemia	2	
Sleep Disturbances/ Insomnia	2	
Cardiac Toxicity	1	
Fertility	1	
Hypertension	1	

*(items marked ** received higher prioritisation than those with *)*

Appendix 4: The ‘shortlist’ of outcome areas

Topic	Ranking (based on number of sources)
Wellbeing & Function	1
Safe Medication Administration	2
Pain	3
Education & Communication	4
Diarrhoea	5
Fatigue	6
(Oral) Mucositis	7
Patient Experience	8
Nausea & Vomiting	9
Septicaemia	10
Nutrition	11

Appendix 5: Suggestions for Specific Indicators of Safety and Effectiveness

Table 5 – Suggested indicators

Measure	Source of measure	Numerator	Denominator	Exclusions	Notes
Safe medication administration					
Incidence of extravasation of cytotoxic drug per thousand treatment cycles	Safety reporting systems	All reported incidents of extravasation	All patients receiving IV cytotoxic chemotherapy per cycle	Patients on oral only medication	Possible issues of under reporting/ recording. Ambiguity when ‘suspected’
Extravasation resulting in ulceration per thousand treatment cycles	Safety reporting systems	All reported incidents of extravasation	All patients receiving IV cytotoxic chemotherapy per cycle	Patients on oral only medication	Possible issues of under reporting/ recording. Needs risk adjustment for regimen
Patient report of pain or irritation at the infusion site per thousand treatment cycles	Patient self-report	Patients reporting pain, irritation or discomfort at a previous infusion site on or since the previous infusion	All patients receiving IV cytotoxic chemotherapy per cycle	Patients attending the first cycle of chemotherapy	Potential for recall or presentation bias. Will require a standard mechanism for recording and collating
Other issues/areas					
Drug administration errors	Safety reporting systems	?	?		Unclear the extent to which available measures relate to nursing role
Drug errors	Safety reporting systems	?	?		Unclear the extent to which available measures relate to nursing role

continued on page 40

Measure	Source of measure	Numerator	Denominator	Exclusions	Notes
Management of toxicities					
Documented assessment of severity of nausea and vomiting (% per treatment cycle)	Clinical control audit	All patients attending for chemotherapy treatment with a record of the severity of nausea and vomiting after last treatment cycle	All patients attending for chemotherapy treatment	Patients attending first cycle of chemotherapy	Documented assessment does not necessarily lead to improved outcomes. Could be labour intensive
Patients reporting severe nausea following treatment (% per treatment cycle)	Patient self-report	All patients reporting 'severe' nausea after last treatment using the C-SAS ⁸³ item/ assessed at attendance for chemotherapy	All patients with assessments recorded	Patients attending first cycle of chemotherapy	Will require a standard mechanism for recording and collating. Will require risk adjustment. Choice of denominator may lead to adverse conclusions if recording/reporting is selective. Will need to be risk adjusted for regimen
Severe vomiting following treatment (% per treatment cycle)	Patient self-report	All patients reporting 'severe' nausea after last treatment using the C-SAS ⁸³ item/ assessed at attendance for chemotherapy	All patients with assessments recorded	Patients attending first cycle of chemotherapy	Will require a standard mechanism for recording and collating. Will require risk adjustment. Choice of denominator may lead to adverse conclusions if recording/reporting is selective. Will need to be risk adjusted for regimen

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