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A Systematic Review of Worldwide Cancer Nursing Research

1994 to 2003

KEY WORDS
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The aim of this study was to assess the cancer nursing research papers published in the past decade; identify their characteristics in terms of country of origin, participants, settings, diagnostic foci, and methodologic choices; and evaluate their quality. A systematic review was carried out of all published papers in the Cumulative Index of Nursing and Allied Health Literature between the years 1994 and 2003, using the keywords ''cancer,'' ''nursing,'' and ''research.'' A total of 619 papers met inclusion criteria and were evaluated by 5 researchers. Almost half the papers were derived from the United States (49.1%), followed by the UK, Sweden, Canada, and Australia. In more than half of the published papers (52.2%), health professionals (mostly nurses) were the studies' participants. Also, much of the published research used patients with mixed diagnosis, or patients with breast or hematologic cancers. Two-thirds of the studies were quantitative, whereas most studies were descriptive in nature. The quality of both quantitative and qualitative studies was low, with only a small percentage meeting the highest quality criteria. Studies reporting funding and those published in journals with an impact factor showed a higher quality score than those not reporting funding or not published in journals with an impact factor. Cancer nursing research is still in a developmental stage, although it has made a considerable contribution to the evidence base of the discipline. A number of issues need to be tackled before we improve our output, such as organizational or workforce issues, infrastructure support, funding, and methodologic challenges.

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Nursing research in general is a rapidly developing field, although its performance against other biomedical disciplines is considered to be poor. This is especially evident in the countries where national research assessment exercises take place, such as in the UK, Australia, Hong Kong, New Zealand, South Africa, and elsewhere. Reasons for this poor performance are discussed and debated widely, and include among other reasons the lack of a research culture in nursing and chronic underfunding.[1–3] Nevertheless, these data are limited to countries where such an assessment exercise takes place, and they do not necessarily reflect the situation in the United States or Canada.

Undoubtedly, cancer nursing has established itself as a main nursing specialty and the discipline looks to research to provide the evidence base for its practice. Since 1974 when the first dedicated journal for cancer nursing research was established (*Oncology Nursing Forum*), followed in 1978 by the first international peer-reviewed cancer nursing journal (*Cancer Nursing*), many nurses have carried out research and disseminated research findings. Since then, research has rapidly expanded and a number of other cancer nursing journals were founded, including (indicatively) a specialist pediatric oncology nursing journal in 1984 (*Journal of Pediatric Oncology Nursing*) and followed in the 1990s by European journals, such as the *European Journal of Cancer Care* in 1994 and the *European Journal of Oncology Nursing* in 1997, all publishing international research. Such expansion in academic peer-reviewed journals highlights the acute need for disseminating through such mediums, ever increasing cancer nursing research activity. It also illustrates the relative "youth" of the academic discipline of cancer nursing research. Furthermore, this also reflects what Wilson-Barnett[4] calls a "new level of maturity" in some areas of cancer nursing research that reflected the researchers' determination to tackle challenging practice issues and to offer cogent presentations of sophisticated research studies. However, no formal evaluation has taken place so far of the cancer nursing research output and its characteristics. Indeed, no such evaluation was found for any other nursing specialty. Such evaluation is important for identifying trends, uncovering gaps, and providing new research directions, and cancer nurses may use such findings as a guide in developing their future research endeavors.

There are a number of ways to evaluate the quality of published research, including citation analysis or bibliometric measurement. However, as a discipline, nursing is not well represented in the Institute for Scientific Information (ISI), which produces the annual journal citation reports and includes only 1 cancer nursing–specific journal among the 36 included in the ISI for 2004 (*Cancer Nursing*). A second journal included in the ISI edited by a nurse, publishing a considerable number of nursing papers (*European Journal of Cancer Care*), is considered to be multidisciplinary in nature and it is not listed in the nursing index of the ISI. Hence, an evaluation was carried out by reviewing papers cited in Cumulative Index of Nursing and Allied Health Literature (CINAHL), an electronic database of publications which includes mostly nursing/allied health journals. The aim of this evaluation was to quantify cancer nursing research output and identify key trends and issues that have proven relevant to cancer nurse researchers. Specific objectives were:

a. to describe the publication output of cancer nursing research in terms of country of origin, areas of foci, subjects, settings, and methodologies used,
b. to explore whether published work is funded or not, and
c. to assess the quality of both quantitative and qualitative studies published.

Methods

A review of the literature was carried out between the years 1994 and 2003, covering a decade of research. It is acknowledged that cancer nurses publish in journals of other disciplines (ie, medical or psychologic), but it would have been difficult to identify which papers were specifically written by nurses. Keywords used for retrieval of publications included "cancer" (MeSH term: neoplasm), "nursing," and "research." "Nursing" is an MeSH term used with diseases for nursing care and techniques in their management. It includes the nursing role in diagnostic, therapeutic, and preventive procedures. Papers were included in the review if they were reporting research findings of any language and were published between January 1, 1994 and December 31, 2003 in CINAHL. Papers were excluded if they were literature reviews, clinical reports, dissertations, conference abstracts, other gray literature, discussion papers, editorials, or letters to the editor, in order to capture only the output of published research.

Data Collection

A data extraction sheet was developed to obtain the required data from each paper. Items included the year of publication, the country of origin of the article, title of paper and first author, the name of the journal where it was published, the impact factor of the journal (if any), the language of the paper, the setting of the study, the population (adult cancer or children and young people), description of participants, the background of the principal investigator (both in terms of profession and place of work), diagnostic group of patients participating in the study, funding source (dichotomous yes-no item), methods used (both in terms of design and data collection method), and sample size. A keyword describing the focus of the study was also included. Finally, 2 sections made judgments about the quality of the reports, one devoted specifically to quantitative and the other to qualitative studies. Country of origin was considered to be that reported under the principal investigator's name, although on several occasions consultation with other bibliographic sources was necessary to confirm this.

■ Assessment of the Quality of Studies

The quality of quantitative studies was assessed using a 3-grade system developed by Mann[5] and adapted by the NHS Centre for Reviews and Dissemination at the University of York in the UK, as part of specific improving outcomes series. In more detail, grade I refers to randomized controlled trials, subdivided into grade IA, where sample size has been calculated and an accurate, standard definition of outcome variables is provided; grade IB, where only the latter is provided; and grade IC, where neither of the 2 are provided. Grade II refers to prospective studies with a comparison group (nonrandomized trial or good observational study) or retrospective studies with controls effectively for confounding variables. This grade is subdivided into grade IIA, where calculation of sample size has taken place, accurate standard definition of outcome variables is provided, and adjustment for the effects of important variables is included; and grade IIB where at least one of the above is provided. Finally, grade III includes all other studies, subdivided into IIIA, when a comparison group, calculation of sample size, and accurate standard definition of outcome variables are included; grade IIIB, when at least one of the above is included; and grade IIIC when none of these are included.

Qualitative studies were assessed using a rating system developed by Cesario et al.[6] Accordingly, studies were scored in relation to 10 items on a scale of 0 = no evidence, 1 = poor, 2 = fair, and 3 = good evidence. Items inquired about the descriptive vividness of the study, methodologic congruence (rigor in documentation, procedural rigor, ethical rigor, and confirmability), analytical preciseness, theoretical connectedness, heuristic relevance (intuitive recognition and relationship to existing body of knowledge), and applicability. Scores between 22.5 and 30 represented studies of good quality (QI), scores of 15 to 22.4 represented studies of fair quality (QII), and scores less than 15 reflected studies of poor quality (QIII).[6]

■ Process

All the abstracts from the articles identified through the database were retrieved. One reviewer read all abstracts and excluded those that did not meet the inclusion criteria. Then, the full text of the selected papers was obtained, either electronically or by ordering articles. A pilot assessment of both the core and qualitative and quantitative data extraction sheet was carried out with 10 papers. Subsequently, several items on the sheet were expanded or clarified. A review team of 5 researchers undertook the data extraction. The reviewers were all experienced in conducting systematic reviews with 3 of them having published such reviews in the past in prestigious journals and all having contributed in the past in such reviews. All reviewers were educated at the PhD level. All 5 reviewers took part in reviewing the papers and completing the data extraction sheet. The number of papers they reviewed ranged from 70 to 300 each, based on the reviewers' specialty and experience with the wider topics (ie, all papers referring to children and young adults were reviewed by an experienced children's and young adult's researcher/lecturer). Each paper was reviewed by one of the team members and then one other reviewer (A. M.) checked all data extraction sheets for consistency with the terms used and to identify and resolve where possible any missing data. The same reviewer also assessed a random sample of about 20% of all papers to assess whether the 2 reviewers agreed in these cases, thus exploring interrater agreement. Agreement with the review data was high, with disagreements present in only about 30 papers altogether, mostly in relation to the keyword used for the therapeutic focus of the paper, which was resolved after discussion.

Keywords describing the focus of each study (nearly 200) were grouped together under a smaller number of broad categories, using simple thematic analysis. Three of the 5 reviewers took part in the classification of keywords: all keywords were grouped by one of the reviewers and then categories and keywords were checked independently by 2 reviewers. Final categories were agreed completely by all 3 assessors.

■ Data Analysis

Data were coded and entered into a statistical package (SPSS). Descriptive statistics were used with all variables, summarizing the data. Kruskal-Wallis tests were carried out between the quality of the published papers and whether an impact factor was assigned in a journal or not, and between the quality of the published papers and whether the study was funded or not. For each country, the number of publications was calculated. The ratio of publications per country was also calculated in terms of each country's population (expressed in millions of inhabitants) and gross domestic product (expressed in billions of $US). The latter comparator was used as an indicator of productivity often used in other similar medical studies[10] and also because the cancer nurses' population in most of the countries around the globe is not known or recorded (indeed, cancer nursing as a specialty is not recognized in many countries). It was not possible to calculate other variables, such as the relationships between graduate-level education in cancer nursing and research activity for different countries, as often such information was not reported in the papers.

■ Results

A total of 751 papers were obtained from the database, but 132 were excluded following review of the abstract because they failed to meet the inclusion criteria. A total of 619 papers were retrieved and included in the analysis (list available upon request). There was a mean of 62 papers published per year with a fairly similar number of publications published each year over the chosen decade (Figure 1). For comparison, there were 3,230 publications in CINAHL under the keyword "oncologic nursing"; 689 publications in PubMed database using the keyword "cancer nursing" and "research"; and

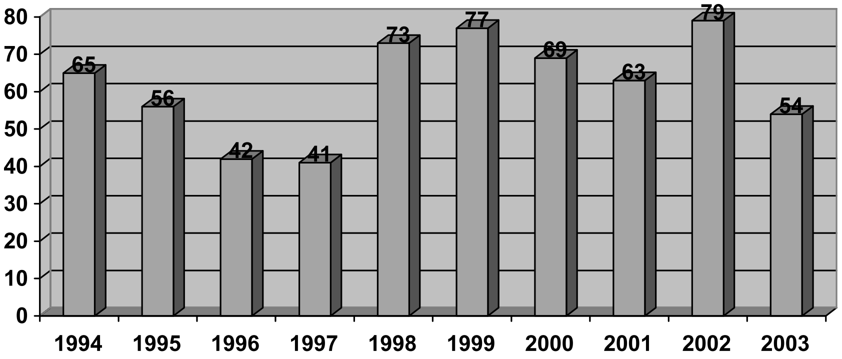

Figure 1 ■ Cancer nursing research papers published between 1994 and 2003 in journals listed by CINAHL.

12,406 papers published in CINAHL over the same period under the keyword "nursing research."

Almost half of the papers came from the United States (49.1%), followed by the UK (18.4%) and Sweden (8.2%) (Table 1). The European Union countries combined (including Norway which is economically linked to European Union) accounted for 34.1% of the total number of published papers (n = 211 papers). China includes Hong Kong and Taiwan, although the majority of the papers were actually derived from Hong Kong. However, if the number of publications is divided by the country's population (rounded to 2 decimal points), the highest output is derived from Sweden (5.6 papers/million of inhabitants), followed by Finland (2.8/million), UK (1.9/million), Norway (1.55/million), and Canada (1.48/million). Compared with gross domestic product, the countries with the highest output included Sweden, Finland, the UK, Canada, and Australia (Table 1).

Only 41% of the papers were published in journals with an impact factor, whereas the other 59% were not published in such journals. Impact factors were generally low, with a mean impact factor of 0.99 (range = 0.18–2). One-fifth of the papers came from *Cancer Nursing* (21.5%) and another fifth from *Oncology Nursing Forum* (20.7%). Papers were published in 77 different journals but 13 journals provided 82.5% of the data, whereas all other journals contributed with less than 1% of the data each (Box 1).

Box 1. Journals where more than 1% of cancer nursing research publications appeared for the current review (in descending order).

Cancer Nursing
Oncology Nursing Forum
Journal of Pediatric Oncology Nursing
Journal of Advanced Nursing
European Journal of Oncology Nursing (1997–2003)
Canadian Oncology Nursing Journal
International Journal of Palliative Nursing (1995–2003)
European Journal of Cancer Care
Journal of Clinical Nursing
Clinical Effectiveness in Nursing (1997–2003)
Journal of Cancer Education
International Journal of Nursing Studies
International Journal of Nursing Practice (1995–2003)
(NB. *The complete list includes a total of 77 journals)*

The language of the papers was primarily English (97.6%), with a small number of papers published in Portuguese (n = 2), Spanish (n = 3), Africaans (n = 2), German (n = 2), Finish (n = 1), and Chinese (n = 1). Funding was reported in 48.4% of the papers, while the rest (51.6%) did not report funding sources.

Table 2 shows the setting of studies, primarily a hospital/cancer center (71.1%), with studies carried out in the inpatient setting being more than double those in outpatient setting (n = 288 vs 134). The study population included adult

Table 1 • Cancer Nursing Research Papers Published in Journals Listed by CINAHL Between 1994 and 2003 by Country (n = 619)

Country	No. of Papers (%)	Ratio of Papers by Country's Population	Ratio of Papers by Country's Gross Domestic Product
United States	304 (49.1)	1.05	0.03
UK	114 (18.4)	1.9	0.07
Sweden	51 (8.2)	5.6	0.2
Canada	46 (7.4)	1.48	0.06
Australia	24 (3.9)	1.2	0.06
Finland	14 (2.3)	2.8	0.1
Netherlands	11 (1.8)	0.69	0.02
China	10 (1.6)	0.007	0.008
Norway	7 (1.1)	1.55	0.03
Greece	6 (1)	0.54	0.04
Japan	5 (0.8)	0.04	0.001
Denmark	4 (0.6)	0.8	0.02
Israel	4 (0.6)	0.66	0.04
Belgium	3 (0.5)	0.03	0.01
Spain	3 (0.5)	0.07	0.004
South Africa	3 (0.5)	0.06	0.03
Italy	2 (0.3)	0.03	0.001
Portugal	2 (0.3)	0.2	0.01
Brazil	2 (0.3)	0.005	0.004
Iran	1 (0.2)	0.01	0.009
Germany	1 (0.2)	0.01	0.0005
Egypt	1 (0.2)	0.01	0.01
Korea	1 (0.2)	0.02	0.002

CINAHL indicates cumulative Index of Nursing and Allied Health Literature.

Table 2 • Settings, Location, or Source of Information Regarding the Studies Included in the Review*

Setting/Sources of Information	n	%
Hospital/cancer center	322	71.1
Community	121	20.4
National (surveys)	58	9.7
International (surveys)	19	3.2
Hospice	10	1.7
Records/papers	10	1.7
Educational	7	1.2
Other	45	6.0

*Percentages are higher than 100%, as in some studies there were more than 1 setting or source of information reported.

cancer patients (49.8%), nurses (31.5%), children and young people (15.9%), both adults and children (2.3%), and other health professionals (0.5%). More specifically, participants were mainly nurses and patients with early disease or advanced disease (Table 3).

Most of the authors (referring to Principal Investigator [PI]) were most often affiliated with an academic institution/university (63.1%), 36.3% of PIs were clinical nurses, 0.4% came from charities, and 0.2% from the industry. In most cases, the PI was a nurse (93%). Furthermore, most studies were single-site studies (63.7%), with 36.3% being multicenter (with at least 2 centers involved). Similarly, the research team composition (authorship) was usually from a single institution (60.6%), with 39.4% from more than 1 institution. Evidence of multidisciplinary research team composition existed in only an almost negligible fraction of the published papers.

In terms of diagnostic focus, most studies used mixed cancer samples (n = 289, 63.6%), followed by studies using patients with breast cancer (14.6%) and patients with hematologic cancers (10.5%) (Figure 2). Nearly one-third (2.8%) of the hematologic papers were specifically related to patients who had undergone a bone marrow transplant. As can be seen in the same figure, the diagnostic focus of cancer nursing research did not match the incidence percentage (for 1998) of these cancers.

Two-thirds of the published studies were quantitative in nature (60.2%), whereas 31.3% were qualitative and 8.5% used mixed methods. As can be seen in Table 4, most quantitative work was descriptive and used survey designs, whereas the most common qualitative design was phenomenology. The most common data collection method (56.2%) was a questionnaire (Table 5). Sample sizes ranged from 1 subject to 2,855. The mean sample size for quantitative work was 204, whereas the mean sample size for qualitative work was 26 (while the mode for the latter was 10). Two hundred seventy-five (46.5%) of the studies involved samples of less than 50 subjects (11.5% with less than 10 subjects), with 113 studies (20%) between 51 and 100 subjects, 144 studies (26.5%) between 101 and 500 subjects, 21 studies (4%) between 501 and 1,000 subjects, and 15 studies (3%) had over 1,000 subjects.

As can be seen in Table 6, most quantitative studies were considered to be grade III, suggesting low quality. There was a significant difference between the quality score assigned and whether the paper was published in a journal with an impact factor or not ($P < .001$), with those published in a journal with an impact factor demonstrating a better quality scoring overall. Similarly, studies which reported a funding source had a significantly better quality scoring than those not reporting a funding source ($P = .002$). Quality assessments of the qualitative studies were also low, with most papers scoring in the category of "poor" (Table 6). Once again, papers published in journals with an impact factor had a significantly better quality score ($P = .003$). There was also a trend in qualitative studies that reported a funding source to score better in terms of quality ($P = .071$), but this did not reach statistical significance.

Simple thematic analysis, as described earlier for the keywords, was also used to categorize the words used to describe the foci of research. The 5 most common categories of study focus were related to symptoms; nursing issues/roles; psychosocial issues; cancer services; and experiences of patients, caregivers, and nurses (Table 7). The category of "symptoms" included mostly descriptive studies of various symptoms as well as symptom assessment and symptom management studies. Pain and fatigue were the symptoms with the largest number of papers (26 and 17, respectively), whereas other symptoms, represented only with a small number of papers, included infections (n = 2), nausea and vomiting (n = 2), sleep (n = 3), skin and wound care (n = 4), diarrhea (n = 2), breathlessness (n = 2), mouth care (n = 4), and lymphedema (n = 1). The category of psychosocial issues had "coping" as its most common topic. The category of complementary therapies included studies on relaxation, massage, music therapy, art therapy, and therapeutic touch. Nursing concepts included comfort, caring, humor, hope, or grief. The category of "research issues" primarily included

Table 3 • Participants in the Studies Included in the Review*

	n	%
Nurses	284	46.9
Early disease	166	27.4
Advanced disease	128	21.2
Carers/relatives/parents	64	10.6
Children	48	8.0
Other health professionals	27	4.5
Healthy subjects (at risk for cancer)	6	1.0
Student nurses	5	0.8
Other	7	1.2
Not specified	18	3.0

*Percentages are higher than 100%, as in some studies there was more than 1 group of participants included. Thirty-one (5.1%) studies did not include any participants but were record reviews, reviews of published papers, or documentary analysis.

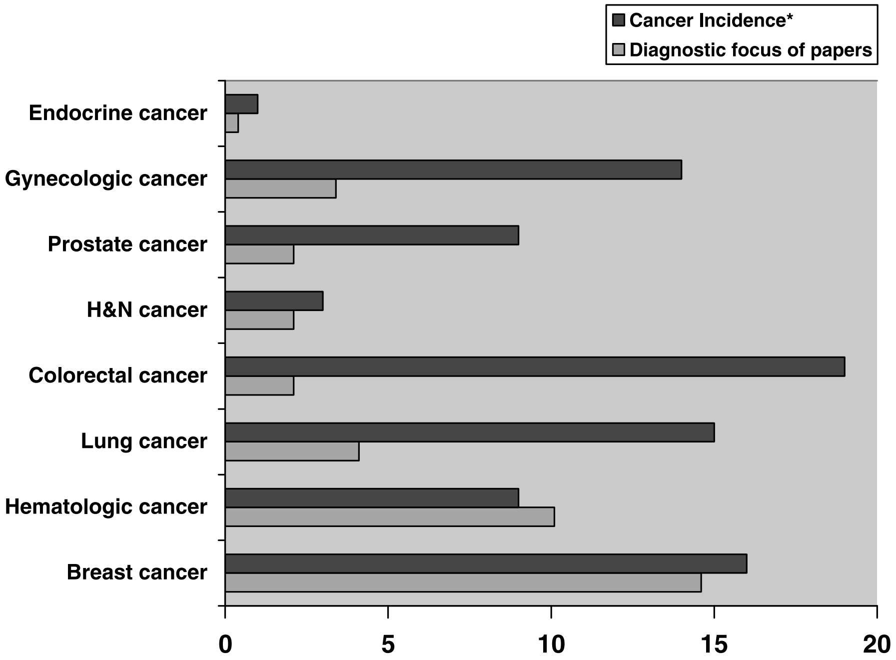

Figure 2 ■ Percentage of papers published with a specific diagnostic focus compared with the incidence of cancers in the developed world.* *Cancer incidence is based on data from References 7 and 8.

studies on research priorities (12/21). Other studies with small frequencies that were not classified in the above categories included studies on sexuality, culture, meaning of illness, central venous access devices, smoking cessation, and primary care issues.

Table 4 • Designs Used in the Studies Reviewed

Design	n	%
Descriptive studies	244	40.4
Cross-sectional/survey	180	29.5
Prospective/longitudinal	49	8.1
Retrospective	17	2.8
Comparative/quasi-experimental	47	7.7
Phenomenology	46	7.4
Randomized trial	36	5.9
Pilot study	25	4.1
Grounded theory	15	2.5
Record review	15	2.5
Delphi technique	14	2.3
Ethnography	12	2
Instrument validation	12	2
Systematic review	12	2
Secondary analysis of data	11	1.8
Audit	11	1.8
Case study	8	1.3
Action research	7	1.2
Ethology	4	0.7
Concept analysis	2	0.3
Meta-analysis	2	0.3
Educational evaluation	2	0.3
Qualitative testing of intervention	1	0.2
Psychoanalytic approach to interview	1	0.2
Crossover	1	0.2
Other, unclassified or missing data	91	12.8

■ Discussion

The current study is the first systematic assessment of cancer nursing research to date. It showed that over a period of 10 years, 619 cancer nursing research papers were published worldwide. Although this number may not seem overly impressive, it does show a significant contribution to the body of nursing knowledge. However, in the absence of other nursing specialty comparators, it is difficult to draw definitive conclusions. The only comparator available is from the broad area of "supportive and palliative care," where worldwide output from all disciplines and all journals from

Table 5 • Data Collection Methods Used in the Reviewed Studies*

Data Collection Method	n	%
Questionnaires	335	56.4
Interviews	187	31.5
Observation	55	9.3
Physiologic measures	30	4.6
Focus groups	27	4.6
Chart/record review	36	6.1
Literature search	12	2
Narratives-story telling	3	0.5
Video-recording	3	0.5
Other	4	0.7

*Percentages are higher than 100%, as in some studies there was more than 1 data collection method used (mixed designs).

Table 6 • Quality of the Reviewed Studies

	N	%
A. Quantitative studies		
IA	2	0.5
IB	15	3.5
IC	22	5.1
IIA	7	1.7
IIB	43	10
IIIA	7	1.7
IIIB	98	22.8
IIIC	226	54.7
B. Qualitative studies		
QI (Good)	13	6.5
QII (Fair)	62	32
QIII (Poor)	123	61.5

both the Science Citation Index and the Social Science Citation Index between 1994 and 2002 was an average of 977 papers annually.[9]

There does not seem to be a significantly increased output over the years, although it is evident that after 1998 more papers were published, perhaps as a result of the establishment of 2 more cancer nursing journals around this time. Also, the role of the Internet is likely to increase the available sites for nurses to share research findings in the future and this may have an effect in studies published in traditional academic nursing journals.

The United States was by far the country contributing most papers with almost half the papers included in the review coming from this nation. This is not surprising as the United States has a longer history of nursing research, started university-based nursing training ahead of many other countries, has more access to research funding (ie, NCI) than any other country, and has been professionally organized with a very strong and influential Oncology Nursing Society for some time. However, when these results are seen in light of each country's population, the Nordic countries (Sweden, Finland, and Norway) seem to be leading the way together with the UK. Sweden by far exceeds publication rates, with 5.9 publications/millions of inhabitants, with the United States being only seventh in this order. What is interesting is when publications are compared with each country's population, small countries, such as Denmark, the Netherlands, Israel, Greece, and Portugal, are all included in the top 12 countries of publication. Similar results are also obtained for publications in relation to each country's gross domestic product, with Finland and Sweden leading the way again, and with the United States being only 13th in this order behind small countries such as Portugal, Norway, Denmark, Israel, and Greece. Similar trends are also observed in biomedical cancer research,[10] whereby it was shown that smaller countries such as Greece doubled their output in the past decade and Belgium substantially increased output, whereas significant increases in the mean impact factor of published papers were noted for countries such as the Netherlands, Finland, Austria, Greece, Belgium, and Spain. The higher publication rates from Sweden and Finland may be influenced by the fact that PhD students must publish a number of papers before they can defend their theses as well as the considerable funding available from the Nordic Cancer Societies. It is notable that smaller countries, such as Nordic countries, Greece, Netherlands, Israel, and Portugal, contribute with a significant output related to cancer nursing research. Clearly, there are professional, cultural, and historical factors that merit further research to explain this finding. Nevertheless, although the United States is undoubtedly in the leading position of cancer nursing research publications, the publication number is not a poor showing on behalf of the other countries, if the difference in the availability of research funding in the United States and Europe or rest of the world is considered.

For those papers published in journals with an impact factor, the mean impact factor was 0.99. This is encouraging, compared with all "nursing" journals listed by the Social Sciences Citation Index for 2004, whereby the highest journal has an impact factor of 1.71 and only 6 journals achieved an impact factor of more than 1.00. This suggests that cancer nursing research is being published in nursing and nonnursing journals (with higher impact factors), thus influencing both cancer nursing and the wider cancer care arena. Many cancer

Table 7 • Foci of Studies Reviewed

	No. of occurrences
Symptoms	108
Nursing issues/roles	87
Psychosocial issues	57
Cancer services	48
Experiences of patients, carers, and nurses	33
Quality of life	23
Nursing theory and concepts	22
Research issues: utilization, barriers, priorities	21
Patient education	17
Complementary therapies	17
End-of-life issues	16
Communication	13
Patient-nurse relations	12
Cancer treatment effects	11
Spirituality	11
Ethical issues	11
Needs assessment	11
Decision making	10
Burnout and job satisfaction	9
Nursing diagnosis	7
Patient information needs	7
Patient satisfaction	6
Patient follow-up	6
Prevention	6
Occupational safety	5
Nursing education	5
Administration of chemotherapy	4
Development of scales	4
Other	32
Total	619

nursing researchers admittedly publish their work in biomedical and psychosocial journals with higher impact factors not listed by CINAHL; however, these would have been difficult to identify for the pragmatic reasons explained earlier. Furthermore, although papers were published in an extensive list of 77 journals altogether, most papers (82.5%) were being published in a small number of high-quality and reputed journals, half of which have an impact factor. This also suggests a growing sense of academic community within cancer nursing and an emergence of highly respected journals with robust peer review systems.

The language of publication in most of the papers was English, suggesting a publication bias toward English-speaking countries (or where English is a major language), but also a bias in the electronic databases, such as CINAHL, which include only a small number of journals not published in English. From experience, many researchers from non–English-speaking countries find it difficult to write in English at an academic level. The near-monopoly of English as the medium of communicating research is a major obstacle in sharing practice and research worldwide. This may professionally isolate nurses who cannot have access to readily available evidence for their practice in their own language. Once again, the contribution of the Internet may alter this situation in the future.

Half the papers had nurses or other health professionals as participants. This, in combination with one of the most common research foci being "nursing issues/nursing roles," suggests that a large part of the research carried out is concerned with professional and practice development issues as well as role delineation. This may suggest that nurses have concerns with their own role and the needs of patients at particularly difficult times during their illness. This may also be indicative of the developmental stage of cancer nursing, indeed a characteristic of nursing as a whole. Nevertheless, there was a decrease over the years about "nursing issues" because although they accounted for 43% of the papers published in 1994, they accounted for 14% to 30% of the papers published over the following decade. Much of the patient-oriented work is with patients earlier in their disease trajectory, perhaps because work with patients with advanced cancer can be perceived as more challenging for both practical and ethical reasons. Work with caregivers is minimal, with only 1 out of 10 studies focusing on caregivers. This is often a group with unmet needs and an underresearched group, hence, future work should address the needs of carers.

Much of the published work are derived from academic settings using a single site only for data collection. This is an expected finding as universities strive for excellence in a competitive academic market. Publication profiles are a key means for increasing their prestige and can act as a quality indicator for nurses employed there. However, as joint posts between academic and clinical institutions emerge, this situation may also change in the future.

The very small proportion of multidisciplinary work is disappointing, especially in the current context of global complex problems requiring an interdisciplinary approach. It has frequently been argued that nurses should participate in interdisciplinary research.[11] If many of the most difficult problems in global or local healthcare are to be solved, they must be tackled from a broader context than any single discipline can provide. Involving researchers from a range of disciplines enables research teams to consider issues from a wide variety of perspectives using a range of methodologic approaches if we are to achieve positive outcomes. This also increases professional isolationism and misses out the opportunity to influence care at a broader healthcare level. We also need to be confident in our own unique contribution to researching the issues and concerns that cancer patients face and build on our unique strength, that of our focus on the human experience and commitment to making the experience as good as it can become.[12]

The diagnostic focus of research seems disproportionate to the disease burden. With 6 out of 10 studies focusing on generic issues of patients with a mixed cancer diagnosis, it suggests that research seems to concentrate on broad issues across all cancers rather than on specialist care needs. With the exception of breast and hematologic cancers (where most of the specialist cancer nursing research is), all other research has been limited in specific diagnostic foci and is disproportionate to specific disease burden. There is an urgent need to move from generic issues that have already been researched to an exploration of more complex and specialist research, which is proportionate to the disease burden. There is absence of work with a number of cancers (ie, brain, testicular, stomach, liver, pancreatic, or bladder) and minimal work with some of the most common cancers (ie, lung, colorectal, or prostate). This is a similar finding within biomedical publications and often relates to the funding awarded from large funding agencies.[7] This diagnostic focus is also absent from research with children and young people, where, other than brain tumors, research often seeks to include the range of hematologic and solid tumors.

Two out of 3 studies were quantitative, using mostly descriptive and survey designs. Time constraints of clinical nurses, lack of funding for most of the cancer nursing research, and the fact that much of the unfunded work are derived from nurses carrying out small-scale research as part of a postgraduate degree may all contribute to this picture. It is also evident that more complicated research designs account for a very small proportion of the overall research output. Among the qualitative research designs, phenomenology seems to be the most preferred design, which may suggest an interest in the experience of cancer from the perspective of the nursing profession.

The quality of the studies reviewed could be considered disappointing. Very few studies, both quantitative and qualitative ones, received high scores. In the majority, important information was not reported, sample sizes were not calculated beforehand, the power of the study was not reported, control for confounding variables was minimal, and clear definitions of outcome variable was absent. Much of the qualitative studies attempted to explain the (often complex) theoretical underpinnings of the chosen method in one small paragraph (which was all the "Methods" section of the article). Inaccuracies and inconsistencies in the study design and explanations were often noticed. Lack of detail was the key characteristic of most of the studies. Previous commentators have drawn attention to the need to improve the quality of qualitative research evidence, in particular, attention needs to be given to methodologic and philosophical detail.[13] If cancer nursing research is to be taken seriously by our interdisciplinary colleagues, quality of reporting should be the first and most important step toward this direction. Further, limited detail makes it almost impossible to allow for the replication of studies. Sample sizes were, however, generally appropriate for the particular designs used.

Symptoms were the most common focus of the studies. This work was mostly descriptive, with little work into symptom management. Work predominantly concentrated on pain and fatigue, accounting for almost 4 out of 10 papers, whereas all other symptoms received minimal attention. Given the complex nature of the symptoms involved, the emphasis on pain and fatigue is not surprising. Nursing issues/roles and cancer services were also common foci of research, suggesting that work around role and practice development, together with research around experiences, psychosocial, and quality of life issues, highlights substantial amounts of research that continue to focus on researchers' particular interests rather than on national or international research priorities.[14]

Research concerning research priorities was a common theme from many parts of the world, however, findings appear to have little relationship with published research priorities. A lot of the research that takes place is dictated by funding priorities, availability of funds, time, resources, and access to specific populations, all of which are outside the sphere of nursing influence or control. Hence, it seems that researching and disseminating research priorities for cancer nursing have not influenced the specialty's research directions in a concrete way. For example, although symptom management is a research priority identified by American,[15] Canadian,[16] European,[17] and Australian[18] studies, the current review showed that most of the work around symptoms is descriptive in nature, with little research around managing symptoms through publishing trials or interventions. Pain, quality of life, and patient education identified as a research priority in past American and European studies[15,17,19] seemed well researched in this review, although other key priorities identified in the past, such as issues around decision making, screening and prevention, ethical issues or communication, were not well-researched areas during the past 10 years. Furthermore, over the 10 years assessed, the issues examined were relatively stable, with only studies focusing on "nursing issues" decreasing, with an increasing focus on "patient issues." There also was a trend in qualitative work increasing (but not substantially) over the years.

The keywords used for this study may be a limitation, as it may have excluded a number of other studies that may have been nurse-led but did not appear in the literature search under the keyword "nursing." A broader search strategy may have resulted in the identification of other papers, although filtering these as nursing or nonnursing would have been difficult. Indeed, a number of the papers published by the authors of the current work did not come up in the list of papers examined, as the keyword "nursing" was not included in their index of keywords. However, we were interested in broad patterns of cancer nursing research rather than more specific issues. Nevertheless, the article still provides a fair representation of the research cancer nurses are doing worldwide, as it covers all publications in cancer nursing journals.

■ Conclusions and Recommendations for Future Research

As some areas of cancer nursing research reach a stage of maturity, there is an urgent need for more influential and innovative work. We need to engage in broad-spectrum research of patient problems and how to manage these—for example, what is the complementary orientation and unique contribution of cancer nursing research, what are the most effective methods of providing supportive care and at different points in the cancer continuum. The focus should be on methodologic challenges, research considerations, and gaps in the evidence base of our profession establishing who we are, what we do, and what effect we have on patient outcomes, as detailed by Richardson et al.[14] The drive toward evidence-based practice is essential for cancer nurses to establish who they are, what they do, and what effect they have on patient outcomes. A recent document by the UK's National Cancer Research Institute highlights, after reviewing nearly 9,000 papers in supportive and palliative care, that: (*a*) work needs to focus more on symptoms such as breathlessness, fatigue, cachexia, agitation, or depression; (*b*) work needs to develop on effective solutions to meet patients needs; (*c*) evaluate services; (*d*) increase work with elderly people and different cultural groups; (*e*) focus on information delivery for patients, and (*f*) develop intervention studies carried out by multidisciplinary research teams.[9]

Symptom management and complex interventions should be a priority for future research, given the popularity of "symptoms" so far, with a more balanced focus toward symptoms other than pain and fatigue. More studies are needed with specific and common cancers (other than breast and hematologic). We need to gain more access to funding and publishing such research, and concentrating in a small number of influential and high-quality journals for dissemination of such findings. We also need to work together and collaborate with other disciplines developing multidisciplinary themes (eg, nutrition or psychosocial care) and exert influence through our publication output not only to cancer nursing but to the wider cancer care community (although to some extent, especially from senior researchers, this is already happening).

A number of issues need to be considered that may drive up the quality of cancer nursing research. There is a need to focus on infrastructure to support our research[9,12] as our lack of progress is intimately related to our research environment.

There is a need to develop a structure to support programs of research. There are very few senior cancer nursing researchers developing programmatic research, and this needs to be improved; from our own experience, there are only a handful of researchers who hold program grants in the United States, several in Canada with a focus however on end-of-life care, and only 2 [collaborative] program grants in the UK. However, several senior researchers have built programs of research, and *Oncology Nursing Forum* is publishing annually in issue 5 a distinguished nurse researchers program of research (ie, the program of research on fatigue by Mock[20] or Frank-Stromborg's work in the rural settings[21] and others). The NCRI[9] (used here as it is the only comprehensive report available to date) has also identified some key issues that need to be tackled in order for research (in palliative and supportive care) to progress, and these seem pertinent to cancer nursing research, too: (*a*) organizational issues (minimize fragmentation across multiple sites and increase collaborative work); (*b*) workforce issues (building capacity, postdoctoral training, combined academic and clinical posts); (*c*) infrastructure support (access to dedicated statisticians and administrative support; data management issues); (*d*) increase in funding; and (*e*) methodologic issues (tackling problems of conducting research with seriously ill patients, outcome measures, involvement of service users).

The interrelationships between the level of academic maturity of cancer nursing research, cancer nursing practice, and the dominance of biomedicine requires further analysis. Reviewing what has been achieved to date can help to highlight how successful cancer nursing has been in putting down roots into the research world. It also shows how far we have still to travel to achieve the goal of being a practice profession based on research evidence.

Evaluation of any research output in studies such as this one is neither straightforward nor flawless. We need to celebrate and be proud of our achievements, as a specialty, during the past 3 decades, but also it is important to remain aware of our weaknesses, adopt strategies to further improve our quality research output in the next decade, and find a clearer research direction which remains relevant to the complex reality of cancer nursing practice. There is a need for more research that is translational in nature (ie, work that explores the implementation of research evidence in practice). Other markers of maturity for the cancer nursing research include more multinational collaborative studies that test the benefits of specific nursing innovations in practice contexts. Additionally, it is essential to consider the needs of cancer patients in developing countries using the combined expertise that exists within the international academic cancer nursing community.

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