Trends spanning 36 years of nursing research

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Trends spanning 36 years of nursing research

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Abstract

PURPOSE: The aim of demonstrating priorities for future research, this study draws on the strengths of text-mining analysis to analyze trends in nursing research in Japan over a 36-year period. METHODS: Documents published in the online version of the Igaku Chuo Zasshi (ICHUSHI) between 1980 and December 2015 were targeted for analysis. Tendencies and trends over time characterizing words used in the titles of all target research papers were analyzed, along with characteristic words. RESULTS: Nursing-related research dropped temporarily, reaching a level of 1,766 papers 1997. Since 2001, however, more than 4,000 papers have been published each year. The most frequently occurring word was "patient," followed in second and third place by "nurse," and "nursing student," respectively. We find two clusters of attributes associated respectively with the twentieth and twenty-first centuries. There was little distance between the attributes for the 2000s and 2010s, for which many more words were extracted than in the previous decades. CONCLUSION: Themes addressed by nursing research are impacted and changed by policy, current events, and the social background. Current priorities in nursing research include "patient and family psychology" and "enhancement of basic nursing education."

Key words; literature review, article title, policy, research trends, text mining

Introduction

The first nursing school in Japan was founded in 1885, and nursing education began with the enrollment of a cohort of five students at Tokyo Voluntary Public Hospital (*Yūshi kyōritsu Tōkyō byōin kangofu kyōikusho*, now the Tokyo Jikei University Hospital)[1)]. Although a second and then a third nursing school were subsequently established, for various reasons these failed to progress, transitioning without ever offering education on what nursing is[2)]. After the Second World War, the duties of nurses were given a statutory basis with the enactment of Act on Public Health Nurses, Midwives, and Nurses (Law No. 203 of July 30, 1948), and higher education in nursing began as professional education and national certification became a requirement[3)]. At this time, the specialization of nursing education and the shift to the university sector was accelerated based on a stated policy of "educational enhancement." Subsequently, nursing was established as an academic discipline, and through nursing research, nursing science began to lay a foundation as a practical evidence-based science. Today, nursing is beginning to follow the path of highly skilled professional careers, and has come to represent a key occupation that will play a leading role in the context of an aging society with a declining birth rate.

Contemporary society is now confronting the so-called "2025 Problem," with more than 30% of the total population expected to be categorized as "elderly" by 2025. In this con-

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text, how to respond to the rapid increase in nursing care costs and other social security expenses is becoming a pressing issue[4]. Furthermore, health challenges have diversified since the turn of the millennium, and we are seeing the emergence of numerous health crises and health disparities. With disparities between regular and irregular employment, overtime work, suicide, and mental health problems, new health issues are occurring in all age groups, including issues of abuse, social withdrawal, and solitary death[5].

Having entered this period of intense social change, nursing must respond to the needs of society. While the themes of nursing research have always evolved in step with the social context and government policy, there has not yet been any comprehensive study of trends in nursing research. In order to suggest possible directions for future research, we must clarify and come to grips with the accumulation of themes that have characterized nursing research thus far.

However, surveying the existing body of research literature necessitates labor and effort, and there are limits to the time, labor, and accuracy that can be brought to bear on the analysis of research themes for literature that has proliferated enormously in today's digital era. Accordingly, statistical text-mining methods able to generate findings by organizing, structuring, and stocking textual data in a database format suited to analysis would be useful. Text mining can convert large quantities of textual and numerical data that cannot be handled manually into diagrams that can be instantly understood, enabling visualization of previously hidden information[6,7]. Also, because this method can be applied to a variety of data, regardless of whether it is structured or unstructured, it is optimally suited to analyzing "micro" themes from big data. Therefore, with the aim of demonstrating priorities for future research, this study draws on the strengths of text-mining analysis to analyze trends in nursing research in Japan over a 36-year period.

Methods

1. Study design

Comprehensive literature survey.

2. Object of analysis

Documents published in the online version of the *Igaku Chuo Zasshi* (ICHUSHI) between 1980 and December 2015 were targeted for analysis. For the survey, we used the keyword "nursing" to search the target literature, limited to original papers in ICHUSHI, using the search formula: ((nursing/TH or [nursing]/AL)) and (PT=[original papers]). For the analysis, paper titles and subtitles (and terms included in the title) were selected for analysis as the minimum unit of data summarizing the content of the paper. When papers written in English included both an English and a Japanese title, the analysis targeted the Japanese title registered in ICHUSHI.

3. Method of analysis

Tendencies and trends over time characterizing words used in the titles of all target research papers were analyzed, along with characteristic words. The Text Mining Studio 6.0.3 software (NTT Data Mathematical Systems Inc., Tokyo, Japan) was used as an analytical tool.

4. Ethical considerations

Care was taken to ensure that the personal information of research participants was protected; that the handling of personal information complied with the provisions of the Personal Information Protection Law, the Code of Ethics for Nurses, and the Ethical Guidelines for Clinical Research; and that copyright would not be infringed when quoting figures, tables, and text from the literature.

Results

A total of 149,886 papers were targeted for analysis, from which 906,211 terms were extracted including 804,387 nouns (88.67%), 72,802 verbs (8.03%), and 29,022 other parts of speech (6.90%). Because checking the original papers indicated that thematic characteristics could be gleaned from the nouns alone, only nouns were set as targets for analysis. We removed proper nouns, synonyms, and pronouns, and a total of 780,867 terms remained for analysis.

1. Trends for terms used in paper titles

Nursing-related research dropped temporarily, reaching a level of 1,766 papers 1997. Since 2001, however, more than 4,000 papers have been published each year. Next, Table 1 summarizes the 20 most frequently occurring terms for all research papers by decade. The most frequently occurring word was "patient" (13,397 instances), followed in second and third place by "nurse" (9,834 instances), and "nursing student" (6,240 instances), respectively.

2. Research content associated with "patient" as the most frequently occurring word

From the results for the 20 most frequently occurring terms by decade (Table 1), we find that "patient" was a highly

Table 1. Top 20 Characteristic Words Related to Nursing by Frequency (n=780,867)

Rank Order	Word	Total	Details	1980s	1990s	2000s	2010s
1	Patient	13,397		3,153	3,716	4,282	2,246
2	Nurse	9,834		1,201	2,032	3,634	2,967
3	Nursing student	6,240		563	1,053	2,820	1,804
4	Assistance	5,547		1,732	2,296	1,219	300
5	Effect	4,695		256	755	2,304	1,380
6	Family	4,152		539	1,026	1,681	906
7	Care	3,647		1,166	1,368	712	401
8	Impact	3,567		287	833	1,517	930
9	Task	3,437		296	505	1,397	1,239
10	Involvement	3,367		511	786	1,306	764
11	Acutual state	3,186		494	766	1,109	817
12	Change	3,135		207	620	1,394	914
13	State	2,953		327	585	1,226	815
14	Evaluation	2,898		332	644	1,267	655
15	Initiative	2,778		100	302	1,282	1,094
16	Comparison	2,629		174	547	1,235	673
17	Discussion	2,624		629	905	822	268
18	Association	2,561		107	457	1,133	864
19	Mother	2,511		297	548	1,030	636
20	Reality	2,459		805	946	494	214

The most frequently occurring word was “patient,” followed in second and third place by “nurse,” and “nursing student,” respectively.

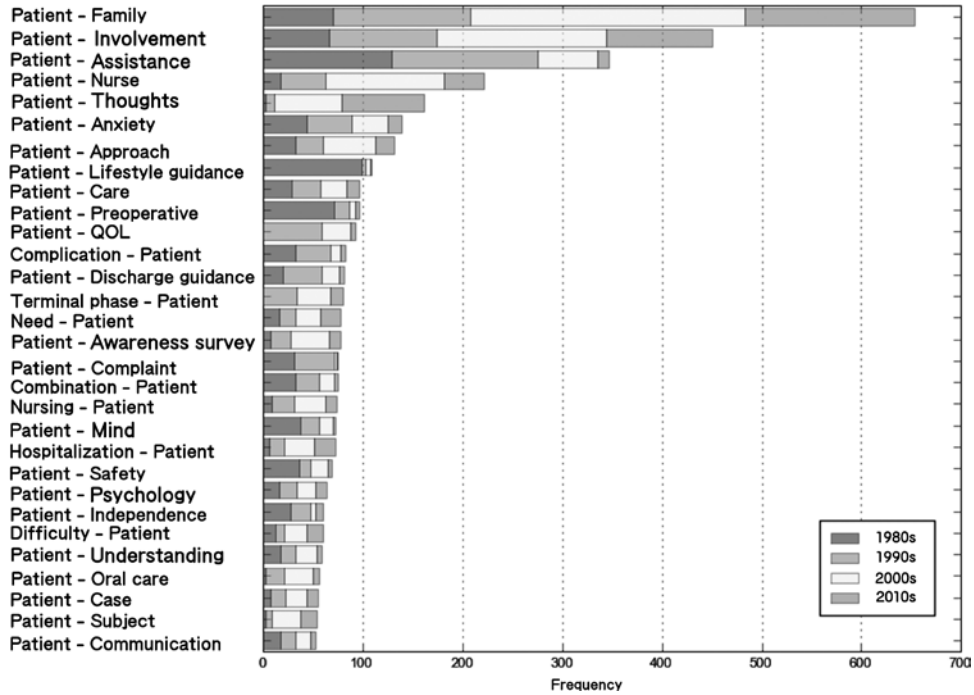

Figure 1. Top 30 Terms Appearing in Dependency Relationship with “Patient”

We find many studies concerned with aspects of patient psychology. The most frequently appearing terms were “patient-family,” “patient-involvement,” and “patient-assistance.”

frequently used word. Therefore, dependency parsing was conducted with regards to the word “patient” to clarify which terms “patient” was used in conjunction with. The top 30 terms appearing in a dependency relationship with “patient” are shown in Figure 1. The most frequently appearing terms were “patient-family” (653 instances), “patient-involvement” (451 instances), “patient-assistance” (347 instances), “patient-nurse” (221 instances), and “patient-thoughts” (161 in-

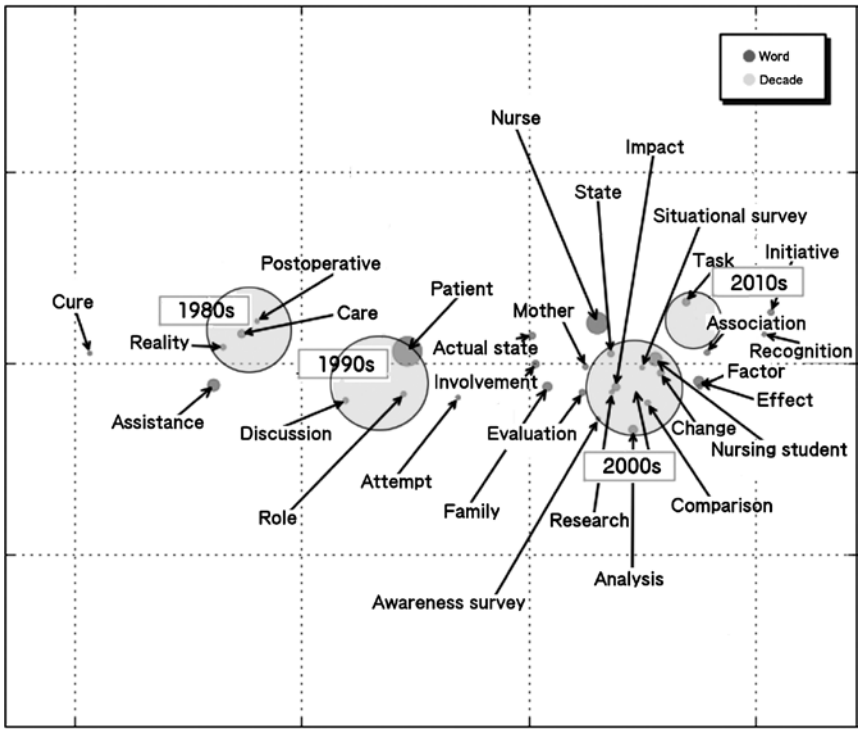

Figure 2. Correspondence Analysis of Word - Decade

We find two clusters of attributes associated respectively with the twentieth and twenty-first centuries. There was little distance between the attributes for the 2000s and 2010s.

stances).

3. Correspondence analysis of frequently appearing words and decade

Correspondence analysis was carried out to visualize the associations of the extracted terms, using decade as an attribute (Figure 2). In the correspondence analysis, the higher the correlation between a word and another word or attribute, the closer it is plotted. Accordingly, it was possible to grasp the characteristics associated with each decade by ascertaining frequently occurring words plotted nearby.

Looking at the overall placement of extracted terms, we find two clusters of attributes associated respectively with the twentieth and twenty-first centuries. In the 1980s, we find “postoperative / care / reality / assistance / treatment,” and around the 1990s “patient / discussion / role.” There was little distance between the attributes for the 2000s and 2010s, for which many more words were extracted than in the previous decades. “Nurse / nursing students / effect” were plotted between these two decades, and thus were evidently associated with both periods. Terms such as “family / involvement / evaluation / comparison” appeared in association with the 2000s and “association / task / initiative / recognition” with the 2010s.

4. Characteristic word analysis for different decades

Categorizing the target of analysis by decade, characteristic words were extracted considering the magnitude of word frequency depending on the degree of complementary similarity (Table 2). Characteristic words are terms that appear with a tendency toward certain attributes in terms of their distribution.

In the 1980s, “assistance,” “center,” and “care” appeared in top positions with phrases associated with surgical care such as “management,” “treatment,” “postoperative,” and “preoperative.” “Assistance” and “care” continued to appear in the top position among characteristic words for the 1990s. Also, “nursing diagnosis” and “assessment” were extracted, and “standpoint,” “QOL,” “total care,” and “home-based care” appeared among the most highly used words. In the 2000s, “nursing student” and “nurse” were extracted in the top positions, with terms associated with research methods such as “effect,” “comparison,” “impact,” “factor,” “state,” “awareness survey” and “situational survey” as characteristic words for this period. The term “family” also appeared. “Nursing student” and “nurse” remained in the top position in the

Table 2. Characteristic Words in Each Decade (n=780,867)

	1980s		1990s		2000s		2010s	
Rank Order	Word	CSM*	Word	CSM*	Word	CSM*	Word	CSM*
1	Assistance	1451.61	Assistance	1695.89	Nursing student	1758.06	Nurse	2614.92
2	Center	1084.98	Treatment	1014.63	Effect	1713.26	Nursing student	1461.15
3	Care	1021.75	Care	798.71	Analysis	1454.23	Task	1422.72
4	Patient	960.44	Correspondence	604.25	Nurse	1034.41	Initiative	1383.05
5	Pediatrics	948.59	Reality	591.32	Comparison	841.19	Effect	1156.45
6	Management	927.36	Nursing diagnosis	500.63	Initiative	839.59	Thoughts	1063.09
7	Treatment	797.00	Patient care	461.64	Change	834.44	Recognition	954.24
8	Actual state	735.43	Assessment	457.00	Impact	801.37	Association	910.98
9	Elderly people	686.67	Pathology	446.63	Family	751.09	Change	753.39
10	Comprehension	684.45	Diagnosis	444.20	Factor	750.93	Learning	695.38
11	Postoperative	661.44	Controversial point	441.10	Evaluation	725.04	Factor	639.56
12	Clinical	552.25	Standpoint	413.91	Recognition	704.17	Experience	630.11
13	Controversial point	496.72	QOL	401.15	Association	669.30	Support	626.15
14	Preoperative	485.38	Discussion	397.56	Task	633.49	State	593.95
15	Rehabilitation	477.17	Artifice	383.87	State	599.41	Impact	580.30
16	Lifestyle guidance	463.05	Role	383.68	Availability	582.81	Post-discharge support	552.03
17	Complication	429.44	Procedure	375.10	Awareness survey	575.84	Focus	528.33
18	Medical	411.95	Need	354.01	Situational survey	551.58	Fact	483.90
19	Diagnosis	405.17	Total care	339.63	Research	548.74	Situational survey	463.24
20	Problem	397.28	Home-based care	331.82	Consciousness	530.84	Difficulty	421.09

*CSM: Complementary Similarity Measure

The 1990s were extracted terms such as “standpoint,” “QOL”, “total care,” and “home-based care.” With the turn of the millennium, a major shift becomes apparent in the extracted characteristic words.

2010s, and terms such as “thoughts,” “recognition,” “experience,” and “learning” appeared, as well as “support” and “post-discharge support.”

Discussion

1. Research trends relating to nursing research

1) Number of nursing-related papers published

Since the 2000s, about 4,000 nursing-related papers have been published each year. A decline in the number of papers can be seen after 1995, which may be attributable to a revision of ICHUSHI’s editorial policies, which involved a redefinition of what constituted an “original paper[9].” The number of nursing universities expanded rapidly as a result of the Assurance of Work Forces of Nurses and Other Medical Experts Law (Law No. 86 of 1992), leading to a corresponding increase in the number of papers. However, the number of researchers has remained largely stable for the past few years.

Because nursing research is a process that seeks to verify and create existing knowledge that affects nursing practices, promoting evidence-based practice and implementing studies that generate clinical evidence are essential for improving nursing quality[10]. The increase in the number of research papers attests to the efforts of researchers to expound on the field of nursing on the basis of scientific knowledge. However, it remains necessary to investigate the reasons for the reduced number of papers in recent years.

2) Themes of interest in Japanese nursing research

For all research papers, among research themes relating to “patients,” research content associated with family were conspicuously frequent. Furthermore, we find many studies concerned with aspects of patient psychology such as “patient-thoughts,” “patient-anxiety,” “patient-awareness survey,” “patient-mind,” “patient-psychology,” and “patient-understanding.” As evidenced by the third (1997) revision to the Medical Care Act, which stipulates that “medical care professional[s] shall give appropriate explanations and endeavor to foster understanding in the recipients of medical care,” our current era is one that emphasizes patients’ decision-making and the provision of adequate information[3]. Even now, the functional differentiation of medical treatment and the establishment of a patient-centered medical treatment provision system are being carried out in response to Japan’s aging society.

As hospitalization stays are being shortened by the functional differentiation of medical treatment, delivery of appropriate information to patients and their families and provision of individualized medical care are becoming necessary[11].

Nursing serves to support patients' lives, and thus, while the concept of "patient-centered medical treatment" became popular in nursing relatively early in comparison with other medical professions, concern for the psychological well-being of patients and their families appears to have increased even further in response to this social context.

Also, with regard to "nurse" and "nursing student" as the next most frequently appearing terms, these relate the background of the improvements in nursing education after the Second World War and the subsequent shift to the university sector. Since the establishment of the first undergraduate program in Japan in 1952, as many as 255 nursing schools have been established nationwide[12]. To date, five curriculum revisions have been carried out based on the government's Designated Rules for Public Health Nursing, Midwifery, and Nursing School and Training School[13]. The findings of this analysis could be said to be a result of the implementation and examination of surveys of nurses and nursing students to enhance nursing education at individual training institutions in accordance with these revisions.

2. Trends in research themes by decade

From the results of the characteristic word analysis by decade, we found that the themes of nursing research also changed with the times, and that this was related to shifts in social context and state policies. In this section, we discuss the social context and themes of nursing research during each period.

1) Research in the context of the 1980s

Among the characteristic words of the 1980s, along with terms related to assistance, many terms were extracted relating to surgical therapy, including "treatment," "postoperative," and "preoperative." This occurred against the background of cancer becoming the leading cause of death in 1981 and the subsequent strengthening of cancer countermeasures in that part of the state. Cancer policy began with the "Comprehensive 10-year Strategy for Cancer Control" in 1984, under which Japan's National Cancer Center and other cancer research facilities were established and an anti-cancer system put in place[14]. Since then, the medical field has made significant advances in research focusing on cancer treatment and prevention. This period also saw an increase in studies to establish treatment methods, with a research focus placed on establishing nursing and other forms of assistance in relation to surgical treatment in nursing research as well.

2) Research in the context of the 1990s

Among the characteristic words of the 1990s were extracted terms such as "standpoint," "QOL" (quality of life), "total care," and "home-based care." During this period, Japan was reeling from the impact of medical accidents and the HIV-tainted blood scandal, and methods of medical treatment came under intense scrutiny. These events spurred the move toward an emphasis on patient empowerment including defending patients' human rights and their right to self-determination[3]. This was a period that saw the spread of concepts such as bioethics, euthanasia, and dying with dignity, as well as a shifting civic consciousness in which the concept of QOL began to gain widespread traction[15]. We find that research themes also changed in response to this social context.

In addition, management and digitization of patient records and medical information began in the 1990s, along with the spread of POS (Problem Oriented System)[16]. From characteristic words such as "nursing diagnosis" and "assessment," we can decipher how themes concerning record-keeping methods were also addressed in nursing research.

3) Research in the context of the 2000s

With the turn of the millennium, a major shift becomes apparent in the extracted characteristic words; "nursing student" and "nurse" occupy the top positions. As opposed to the earlier strong degree of interest in themes such as patient-oriented "assistance" and "care," a shift was now underway toward studies of nurses and research concerning nursing education. Many terms were extracted in a lower position associated with research methods, as expressed by "change," "impact," "evaluation," and "association." This corresponded to a period when the number of nursing universities was increasing in Japan, and we may also cite the increases in the number of nursing researchers and in the number of studies concerning nursing education[12]. Also, it was around this time that the low level of ability in clinical practice of nursing staff hired as new graduates came to be recognized as a problem, with indications of a gap between teaching conducted in basic nursing education and the practical ability required in clinical practice[17]. It could be argued that the increase in the number of surveys and studies of educational methods to cultivate practical nursing abilities reflects efforts undertaken to bridge this gap.

4) Research in the context of the 2010s

In response to the trend identifying gaps between education and clinical practice, the 2009 curriculum revision based

on the Designated Rules for Public Health Nursing, Midwifery, and Nursing School and Training School introduced educational content that was aimed at strengthening practical nursing abilities[18]. Nevertheless, the relative lack of life experience and low level of communicative ability among these young people were demonstrated, which prompted the requirement for a more thorough education[19]. Against this background, research on the themes of basic nursing education and the qualities desired among nurses has continued, with "nurse" and "nursing student" appearing as the top characteristic words in the 2010s, just as in the previous decade.

In contrast, there has been a shift toward studies that respect patient and family intentions, as shown by lower-ranking terms such as "thoughts," "recognition," and "experience." Also, the characteristic words "support" and "post-discharge support" can be interpreted to reflect the transition from a hospital-centric era to one of comprehensive regional care systems[20]. The concepts of "QOL" and "palliative care" that had spread in the 1990s became established with the shift to a "patient-centric" model of medical care in the 21st century. Currently, in the face of aging demographics and increased incidence of chronic illness, treatment advances are being made alongside development of medical care, and the number of patients receiving at-home treatment or care has increased. More attention is being paid to the question of living with illness, and the role of nurses in providing living support is gaining importance[21].

Practices that take living support into consideration have become the center of community-based medical care. It has become necessary to envision how patients and clients will lead their lives not only while in hospitals or other institutions, but in the future as well. Rather than taking a case-by-case approach to problem-solving, this means adopting a long-term perspective on individual lives and future prospects and providing support and encouragement so that patients will be able to exercise their strengths fully and completely. This will necessarily entail developing medical knowledge and nursing skills as well as personalized assistance[13]. The characteristic words extracted could be said to depict the attitudes of nurses who, having fully grasped the needs of their patients, provide information based on specialized knowledge in an attempt to support independent decision-making by patients and their families.

Conclusions

1. Themes addressed by nursing research are impacted and changed by policy, current events, and the social background.
2. Current priorities in nursing research include "patient and family psychology" and "enhancement of basic nursing education."
3. Future development of comprehensive regional care systems suggests the need for nursing research into the provision of support for independent "decision-making."

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