

# Patterns of international collaboration in nursing and palliative research

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## Abstract

**Objective:** To investigate patterns of international collaborations in nursing and palliative research by collecting data from Medline and to visualize data using Google maps and social network analysis(SNA).

**Methods:** Selecting 378 abstracts, author names, countries, keywords, and medical subject headings (MESH) on November 22, 2017 from the Medline in terms of title with nursing and palliative, we reported following features: (1) nation and journal distribution in papers regarding nursing and palliative; (2) research features represented by paper author-defined keywords and MESH terms. We programmed Microsoft Excel VBA routines to extract data from Medline. Google Maps and SNA Pajek software were performed to display visualized representations for this study.

**Results:** We found that (1) the most number of papers regarding nursing and palliative are from nations of U.S. (105, 37.23%) and U.K. (41, 14.54%);(2) the most number of journals in production of nursing and palliative are Int J Palliat Nurs (54, 14.29%) and J Palliat Med (21, 14.29%); (3) the most linked keywords are palliative care and nursing home; (4) the most linked MESH terms are nursing homes and palliative care.

**Conclusions:** Social network analysis provides wide and deep insight into the relationships among nations, coauthor collaborations, and abstract keywords. The results can be provided to strategy and decision making for readers in future.

## Introduction

Comorbid is defined in medicine as existing simultaneously with and usually independently of another medical condition. In hospital settings, palliative care and cancer care patient are often combined and occurred together [1,2]. As for palliative care nursing, patient care of knowledge and attitude are also commonly and often co-occurred with one another [3,4]. In many situations, it is very hard to observe the association of two or more symptoms at one moment.

An apocryphal story often told to illustrate the concept of co-occurrence is about beer and diaper sales. It usually goes along with both beer and diaper sales which were strongly correlated [5-7] in a market place. All possible pairs of our observed phenomena or entities can be combined and analyzed using computer techniques. However, we have not seen any computer algorithms telling us how to select the most possible pairs co-occurred in a system.

### Social network analysis(SNA)

Social network analysis(SNA) [8-10] has been applied to authorship collaboration in recent years. Co-authorship among researchers can form a type of social network, called co-author network [11]. We are thus interested in using SNA to explore the most pair relations (e.g., beer and diaper in a marking sale) for a topic such as nursing and palliative from data we observed and collected.

### Author collaborations and international relations

Many papers have been collected and saved at the US National Library of Medicine National Institutes of Health(Pubmed.com).

However, we have not seen any using Google maps to show their study results in literature even if some computer scientists have placed high hope on those machine-learning algorithms, data mining or artificial intelligence to quantify research information [12,13]. Extracting the Pubmed (or say Medline) published papers may be a way to show some important information of a specific topic(eg, nursing and palliative) on google maps, especially for the reason that using internet information to increase the yield of knowledge from data generated in the course of inquiry[14-16]. How to display our results on Google maps is required to explore and study.

### Aims of the study

Our aims are to investigate patterns of international collaborations in nursing and palliative research by collecting data from Medline and to visualize results in following representations: (i) nation and journal distribution in papers regarding nursing and palliative; (ii) research features represented by paper author-defined keywords and medical subject headings (MESH) terms.

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## Methods

### Data sources

We programmed Microsoft Excel VBA (visual basic for applications) modules for extracting abstracts and their corresponding coauthor names as well as keywords on November 22, 2017 from the US National Library of *Medicine National Institutes of Health (Medline)*. Only those abstracts entitled with nursing and palliative and labelled with Journal Article were included. Others like those labelled with Published Erratum, Editorial or without author nation name were excluded from this study. A total of 378 eligible abstracts were obtained from Medline since 1990.

### Data arrangement to fit SNA requirement

We analyzed 378 papers with complete data including author countries, author-defined keywords, and article MESH terms. Prior to visualize representations of research findings using SNA, we organized data in compliance with the SNA format and guidelines using Pajek software [17]. Microsoft Excel VBA was used to deal with data fitting to the SNA requirement.

### Graphical representations to report

#### 1. Author nations and their relations

Two cross tables (ie. columns for publication years and rows for the 1<sup>st</sup> author nations as well as journals) were produced presenting the distribution of nations and the most number of journals publishing papers of nursing and palliative. The bigger bubble means the more number of the nodes (ie, nations, keywords, or MESH terms in this study). The wider line indicates the stronger relations between two nodes. Community clusters are filled with different colors in bubbles.

#### 2. Keywords and MESH terms to present the research domain

If keywords represent the research domain, the stronger relations between two keywords can be highlighted by SNA, like the concept of co-occurrence about beer and diaper sales. The presentation for the bubble and line is interpreted similar to the previous section.

### Statistical tools and data analyses

Google Maps [18] and SNA Pajek software [17] were used to display visualized representations for papers published in a relation to nursing and palliative. Author-made Excel VBA modules were applied to organize data.

## Results

### Author nations and their relations

A total of 282 eligible papers with complete author nations based on journal article since 1990 are shown in Table 1. We can see that the most number of papers are from nations of U.S. (105, 37.23%) and U.K. (41, 14.54%). The trend in the number of publications with authorship from countries is present in the column of correlation in Table 1. The diagram shown by SNA and Google Maps in Figure 1 displays author collaboration among nations based on terms of nursing and palliative in abstract title. The highest productive areas are from U.S. and Europe. Any nation collaborated with other nations are shown with a blue line. Interested authors are recommend to click the bubble of interest to see details on a website at reference [19] (Table 1 and Figure 1).

### Journals and the trend

The most number of journals in production of nursing and palliative are from *Int J Palliat Nurs* (54, 14.29%) and *J Palliat Med* (21, 14.29%). The trend in the number of publications for a journal is shown in the column of correlation in Table 2.

### Keywords to present the feature of research domain

The most linked keywords are palliative care and nursing home, see Figure 2 or click it on the reference [20]. We can see that the two bigger bubbles are of palliative care and nursing home in the yellow cluster (Figure 2).

### MESH terms to present the feature of research domain

The most linked MESH terms are nursing homes and palliative care see Figure 3 or click it on the reference [21]. We can see that the two bigger bubbles are of palliative care and nurse-patient relation in the yellow and green clusters.

## Discussion

This study used SNA techniques to report: found that (1) U.S.(105, 37.23%) and U.K.(41, 14.54%) are nations with the most number of papers entitled nursing and palliative; (2) the most number of journals publishing papers of nursing and palliative are *Int J Palliat Nurs* (54, 14.29%) and *J Palliat Med* (21, 14.29%); (3) the most linked keywords are palliative care and nursing home; (4) the most linked MESH terms are nursing homes and palliative care.

### What this adds to what was known

Many previous researches [8-10] have investigated coauthor collaboration using SNA. An apocryphal story often told to discover the co-occurrence about beer and diaper sales [5-7]. However, we have not seen any that can demonstrate a concrete way to show how to conduct such an exploration and to present informative messages to readership. We showed that incorporating SNA with Google Maps is an easy way to display all possible pairs of our observed phenomena at a short moment.

Journal authorship collaboration can be compared with each other using Google Maps. We can see that many links connecting two nations which indicate a collaboration pattern in paper publication similar to the previous study [8]. Hence the researchers have many international author collaborations in the subject category of nursing and palliative which is inconsistent with the previous studies that investigated scientific collaboration of Iranian Psychology and Psychiatry Researchers [22,23].

There are 1611 papers with the keyword social network analysis in paper title when searching Pubmed database in 2017 September 1. Only two papers [24,25] incorporated MeSH into social network analysis to explore interesting informative knowledge. However, no any that can incorporate Google maps in a study to show more value information like the current study. The way we illustrated the strongest relation in all possible couples of interests is novel and promising in future, especially in the field of nursing and palliative fields.

### What it implies and what should be changed?

Scientific publication is one of the objective measurements to evaluate the achievements of a medical specialty or discipline [26]. It is worth using SNA and Google Maps to report journal features in future.

**Table 1.** Nation distribution based on the 1st author for papers regarding nursing and palliative.

Nation	1990-2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total	Corr.	%
U.S	40	9	4	9	3	6	6	2	7	8	11	105	0.21	37.23
U.K	24	3	2	3		1	2		1	4	1	41	-0.18	14.54
Australia	12	2	2	1		1	1	1	4		2	26	0.06	9.22
Canada	14	1	1	2	2	2	1			1	1	25	-0.42	8.87
Sweden	2	2					1	3	1	1	3	13	0.48	4.61
Ireland	4					2		1	1	1		9	0.34	3.19
France	2	1	1					1	1			6	-0.28	2.13
Germany	1			1	1		1				2	6	0.29	2.13
Belgium	0							2		1	2	5	0.67	1.77
Brazil	0						2			2	1	5	0.54	1.77
Netherlands	3	1		1								5	-0.61	1.77
Spain	1							1		2	1	5	0.68	1.77
Taiwan	0		1			1			2		1	5	0.29	1.77
Denmark	0	1		1	1				1			4	-0.43	1.42
Austria	1							1			1	3	0.52	1.06
Japan	1			1							1	3	0.17	1.06
India	0			1	1							2	-0.35	0.71
Italy	0							1			1	2	0.52	0.71
Portugal	0				1					1		2	0.17	0.71
Saudi Arabia	0										2	2	0.52	0.71
Finland	0										1	1	0.52	0.35
Iran	0										1	1	0.52	0.35
Lebanon	0		1									1	-0.41	0.35
Lithuania	0							1				1	0.17	0.35
New Zealand	0			1								1	-0.29	0.35
Nigeria	0		1									1	-0.41	0.35
Norway	0			1								1	-0.29	0.35
Switzerland	0								1			1	0.29	0.35
Total	105	20	13	22	9	13	14	14	19	21	32	282	0.46	100.00

**Table 2.** Journal distribution for papers regarding nursing and palliative.

Journals	1990-2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total	Corr.	%
Int J Palliat Nurs	25	5	5	3	3		1	4	2	1	5	54	-0.29	14.29
J Palliat Med	11	2				1	3		1	1	2	21	0.24	5.56
J Adv Nurs	9	2				2						13	-0.44	3.44
Br J Nurs	6	2				1				1	1	11	-0.08	2.91
Palliat Med	7					1	2			1		11	0.21	2.91
J Clin Nurs	2		2	3					1	1	1	10	-0.14	2.65
Am J Hosp Palliat Care	2	1								3	2	8	0.51	2.12
J Am Med Dir Assoc	2	1		1	1			1	1		1	8	0.00	2.12
J Pain Symptom Manage	1			1	1		1		2	1	1	8	0.52	2.12
J Palliat Care	6							1			1	8	0.52	2.12
Nurse Educ Today	2	1						1	2	1		7	0.29	1.85
Palliat Support Care	0	1	1	1					1		3	7	0.21	1.85
Gan To Kagaku Ryoho	4			1	1							6	-0.35	1.59
Nurs Times	4		2									6	-0.41	1.59
Pflege Z	2	2		1			1					6	-0.58	1.59
Soins	3	1			1				1			6	-0.27	1.59
Clin J Oncol Nurs	0		1		1		1			1	1	5	0.24	1.32
J Prof Nurs	1	2								2		5	-0.09	1.32
BMC Palliat Care	0									2	2	4	0.70	1.06
Br J Community Nurs	2		1					1				4	-0.17	1.06
Total	145	27	21	26	12	15	15	25	24	24	41	378	0.03	100

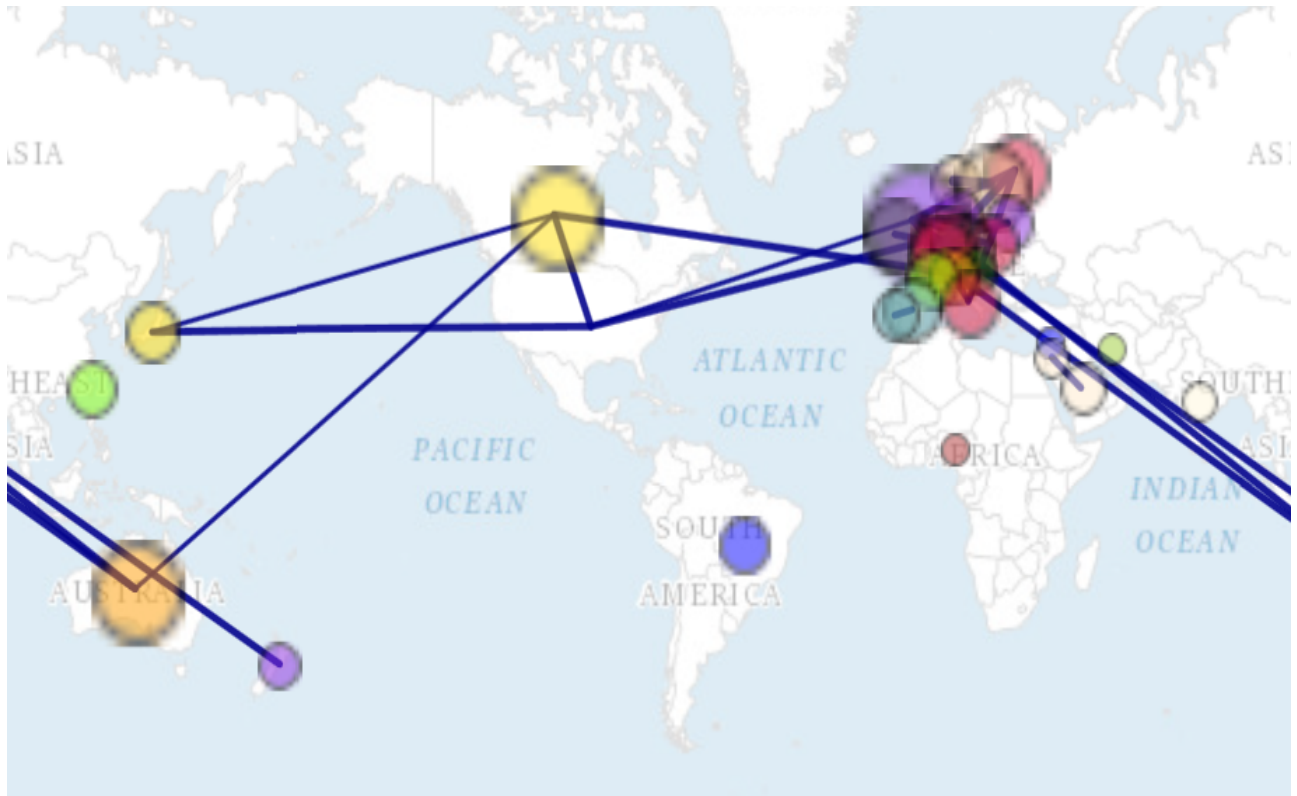


Figure 1. International coauthor collaboration in topics of nursing and palliative.

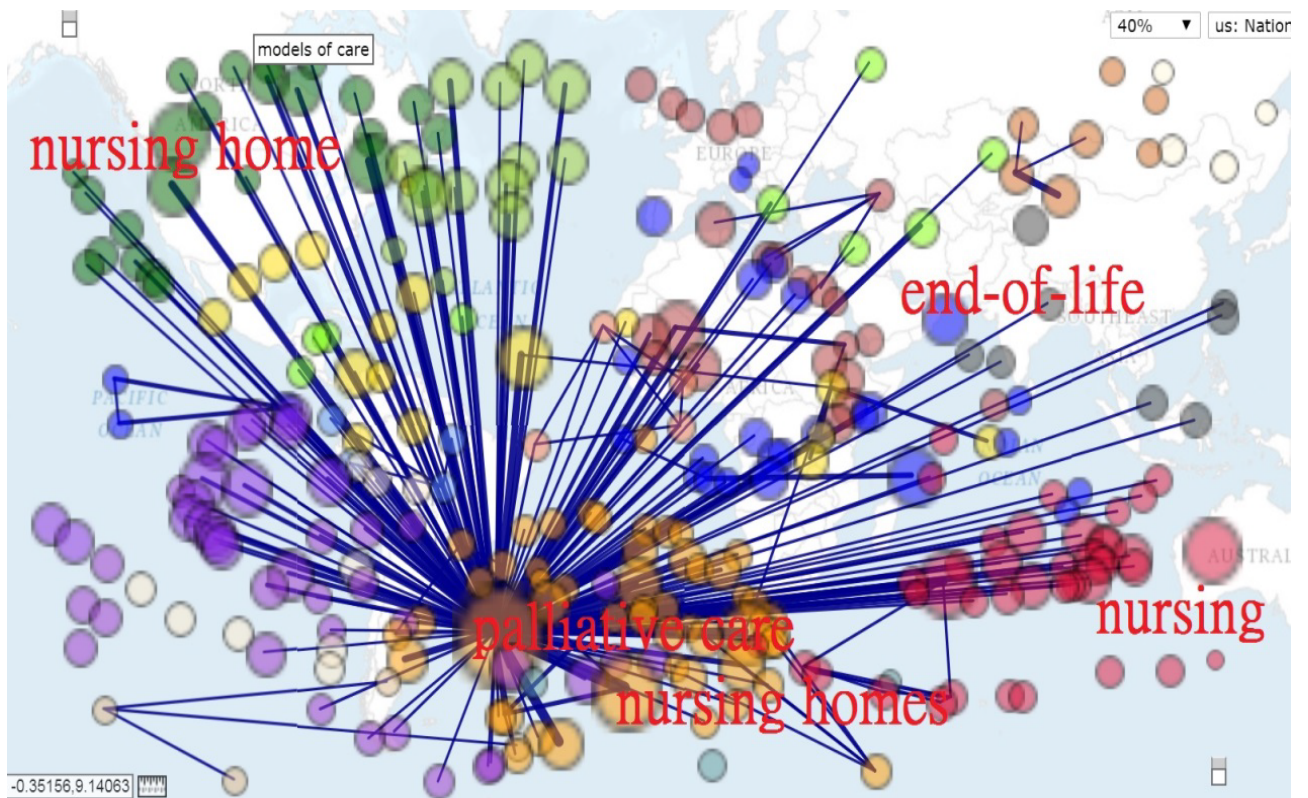


Figure 2. Keywords in papers regarding nursing and palliative.





Figure 3. Mesh terms in papers regarding nursing and palliative.

Several algorithms and measures have been developed and used with SNA to graphically explore data. If we investigate whether any author or paper most fits the research domain of a journal and its scope within the journal's keyword network, the centrality measures using SNA can be applied [8]. It means that the core subject can be analyzed using the centrality measure [23, 27] yielded in SNA.

### Strengths of this study

The way incorporating SNA with Google Maps is unique, which is never seen in other published papers [8-10] with a single SNA presentation. Another strength and feature for this study is the Google Maps used and linked in references [19-21] for interested readers who can quickly understand the features of the study. The nation distribution in Figure 1 is merit in easily understanding the feature of international collaborations for the topics of nursing and palliative. One picture is worth ten thousand words. We hope following studies can report more such kinds of information using SNA and Google Maps to readers in future.

### Limitations and future study

The interpretation and generalization of the conclusions of this study should be carried out with caution. First, the data of this study were collected from Medline for a single journal. It is worth noting that any attempt to generalize the findings of this study should be made in the similar journal domain with similar topic and scope contexts.

Second, although the data were extracted from Medline and carefully dealt with every linkage as correct as possible, the original downloaded text file including some errors in symbols such as period and comma in author address that might lead to some bias in the resulting nation distribution.

Third, there are many algorithms used for SNA. We merely applied separation components showing in Figures. Any changes made along with algorithm used will present different pattern and judgment.

Fourth, the social network analysis is not subject to the Pajec software we used in this study, Others such as Ucinet[28] and Gephi[29] are suggested to readers for use in future.

### Conclusion

Social network analysis provides wide and deep insight into the relationships among nations, coauthor collaborations, and abstract keywords. The results can be provided to strategy and decision making for readers in future.

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