TEHRAN UNIVERSITY OF MEDICAL SCIENCES

Nursing Informatics Paradigm Shifting

Asieh Darvish

‣ PhD of Information Technology Management
‣ MSc of Medical Information Technology Management
‣ BSc of Nursing
sedarvish@yahoo.com
http://www.nursing-informatics.ir

March 15, 2021

School of Nursing and Midwifery, Medical Surgical Nursing Department

The International
Online Course

2021
Feb. 20–Mar. 15
15:30 – 17:30 GMT

Fundamentals of
Nursing Informatics

Lecturers, Topics, Date & Time

PhD in Health Information Management, Health Informationist, Tehran University of Medical Sciences

Topic: Nursing Informatics Principles

20 February 2021

Tania Azadi
PhD, MSc, BSc

Informatics Nursing board certification-ANCC, Certified Nurse Educator-NLN, With publications on informatics for nurses and healthcare profesionals

Topic: Competencies of Nursing Informatics Specialists

27 February 2021

Toni Hebda
PhD, MNEd, MSIS, RN-C, CNE

DNP of Nursing Informatics, MSc of Nursing Informatics, With publications on informatics for nurses and healthcare profesionals

Topic: Nursing informatics Standardized Terminologies

6 March 2021

Melody Rose
DNP/NI,MSN/NI, RN

With publications on informatics for nurses and healthcare profesionals, Expertise in project management

Topic: Preparing for the Future of Nursing Informatics

15 March 2021

Carolyn Sipes
PhD, CNS, APRN, PMP, RN-BC, NEA-BC, FAAN

School of Nursing and Midwifery, Tehran University of Medical Sciences; Head of Nursing Informatics Department, VUMS

Topic: Nursing Informatics Paradigm Shift

15 March 2021

Asieh Darvish
PhD/ITM, MS/ MITM, BSN

Nursing and
Information Technology

Asieh Darvish, TUMS, School of Nursing & Midwifery

Objectives

▸ Review trend of NI publications

▸ Explore prolific countries

▸ Identify Sources with most number of articles

▸ Discuss Paradigm Shift of NI

Florence Nightingale

"In attempting to arrive at the truth, I have applied everywhere for information, but scarcely an instance have I been **able to obtain hospital records** for any purposes of comparison.


▸ If they could be obtained, they would **enable us to decide** many other questions besides the one alluded to. They would show subscribers **how their money was spent**, what amount of good was really being done with it, or whether the money was not doing mischief rather than good."

"Notes on a Hospital,"**1873**

Introduction

- In 1995, the American Nursing Association published the scope and standards of nursing informatics, and in 2001, by merging them, the definition of nursing informatics as a combination of nursing science, computer science and information science to manage and communicate data, knowledge and the nursing profession.

- Gradually, professional organizations and specialized groups and university education courses and research in this field of science were developed.

- Many universities are teaching academic program of Nursing informatics in the world up to the doctoral level and it is a subject for research in different countries.

Future roadmap
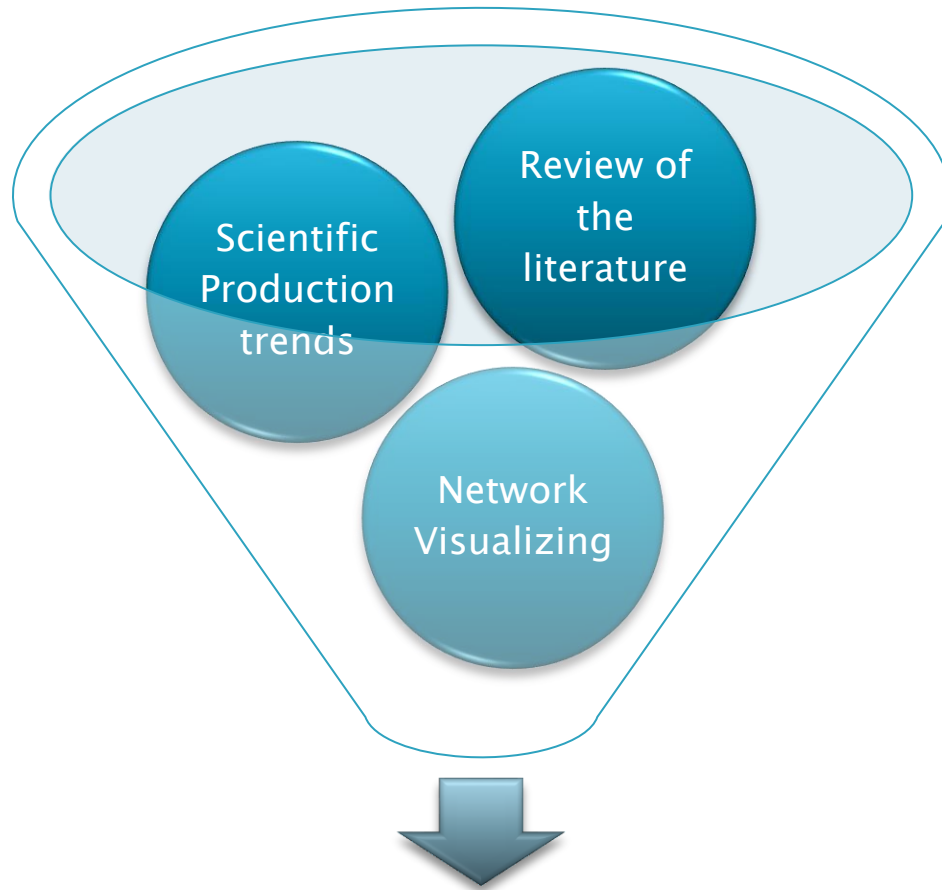
A roadmap for the future

Bibliographic map

The pattern of ==top authors==, ==countries==, ==institutions==, and ==journals==, collaboration ==networks==, ==keyword== repetition, and the ==history== and paradigm shift.

▸ It is possible to illustrate scientific productions with various bibliographic maps.

Nursing Informatics Publications

Database	Record Number
Pubmed	13,110
Scopus	8922 (TITLE-ABS-KEY (nursing AND information AND technology) OR TITLE-ABS-KEY (nursing AND informatics)
Web of Science	5679 (topic)

Search Strategy:
Nursing Information technology OR nursing informatics

Darvish, Asieh; Tabibi , Seyed Jamaluddin; Alborzi M, Radfar R. Investigating the trend of scientific productions in the field of nursing information technology. Quarterly Journal of Nursing Management. 2018 Jun 10; 7 (1): 61-72.

Pubmed search

Pub**Med**.gov

Information technology nursing OR nursing informatics   ✕   **Search**

Advanced   Create alert   Create RSS   User Guide
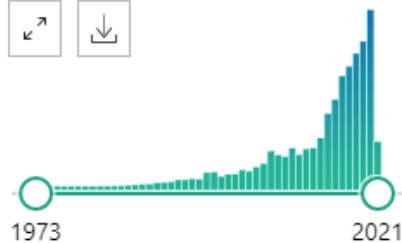
Save   Email   Send to   Sorted by: Best match   Display options

MY NCBI FILTERS 🗗

13,110 results

RESULTS BY YEAR

1973   2021

TEXT AVAILABILITY

☐ Abstract
☐ Free full text
☐ Full text

8 articles found by citation matching

Ethics in informatics: the intersection of nursing, ethics, and information technology.
Curtin LL. Nurs Adm Q. 2005. PMID: 16261000 No abstract available.

[Education in informatics should be included in all nursing curricula. Trends in information and communication technology].
Goossen WT, et al. TVZ. 1997. PMID: 9439237 Review. Dutch. No abstract available.

Integrating Health Information Technology Safety into Nursing Informatics Competencies.
Borycki EM, et al. Stud Health Technol Inform. 2017. PMID: 28106601

Show all 🗗

Scopus search

scopus.com/term/analyzer.uri?sid=3351592afe32c3ea004e3c299bed30f3&origin=resultslist&src=s&s=%28TITLE-ABS-KEY%28nursing+informati...

‹ Back to results

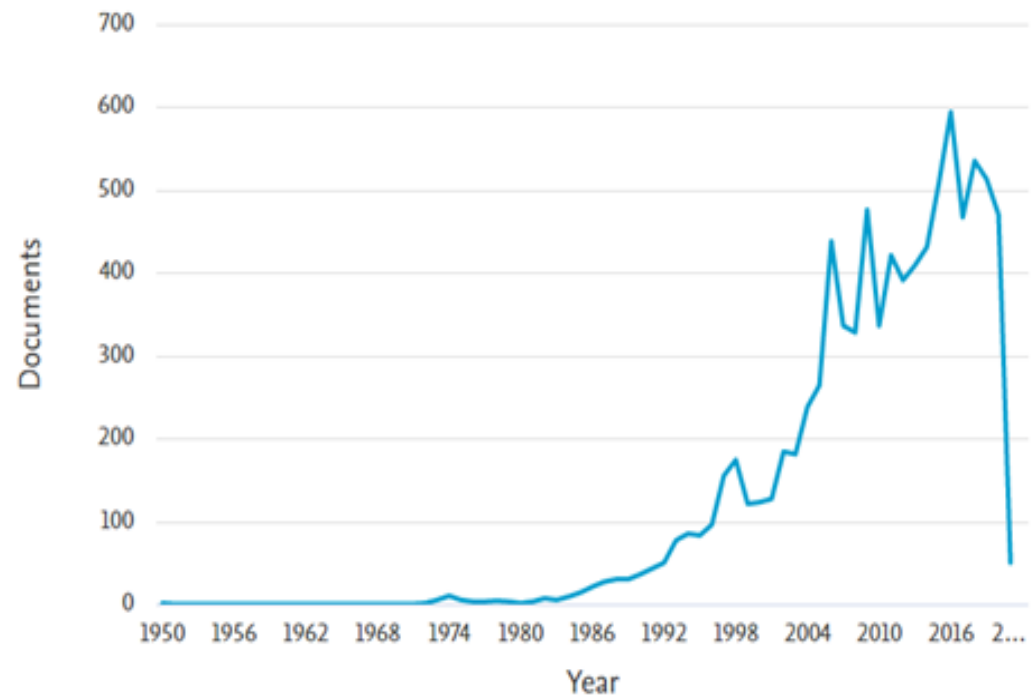→] Export   🖶 Print   ✉ Email

(TITLE-ABS-KEY (nursing AND information AND technology) OR TITLE-ABS-KEY (nursing AND informatics))

8,922 document results

Select year range to analyze: 1950 ⌄ to 2021 ⌄   **Analyze**

Year ↓	Documents ↑
2021	50
2020	470
2019	513
2018	535
2017	467
2016	594
2015	508
2014	431
2013	409
2012	391

Documents by year

Asieh Darvish, TUMS, School of Nursing & Midwifery

Asieh Darvish, TUMS, School of Nursing & Midwifery   3/15/2021   12

Documents per year by source

Compare the document counts for up to 10 sources.

Compare sources and view CiteScore, SJR, and SNIP data
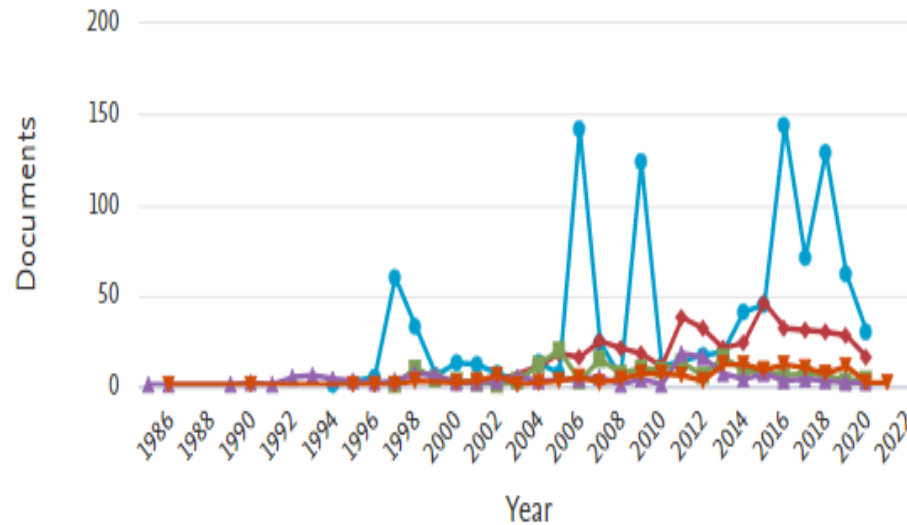
| Source ↓	Documents ↑
■ Studies In Health Technology And Informatics	1038
■ CIN Computers Informatics Nursing	421
■ International Journal Of Medical Informatics	178
■ Nursing Management	138
■ Nurse Education Today	136
☐ Computers In Nursing	107
☐ Journal Of Advanced Nursing	101
☐ Nursing Administration Quarterly	94
☐ Online Journal Of Nursing	93

Legend:
- ◆ Studies In Health Technology And Informatics
- ✦ CIN Computers Informatics Nursing
- ✚ International Journal Of Medical Informatics
- ★ Nursing Management
- ✚ Nurse Education Today

Documents by author

Compare the document counts for up to 15 authors.
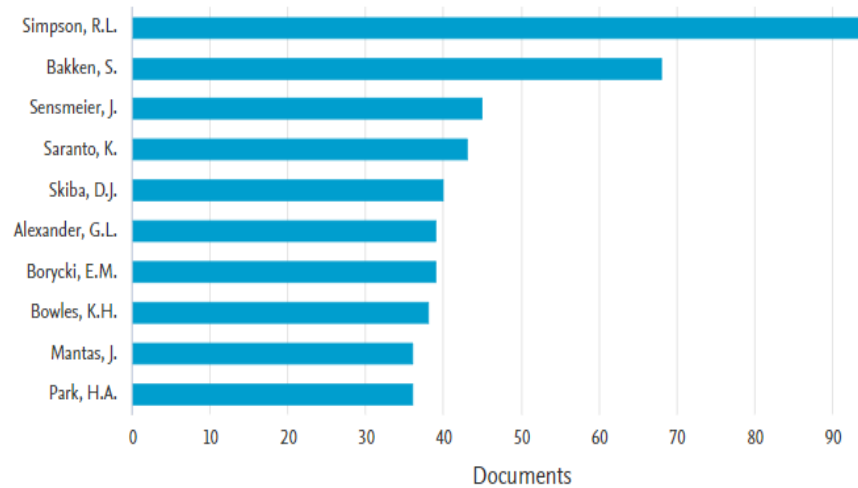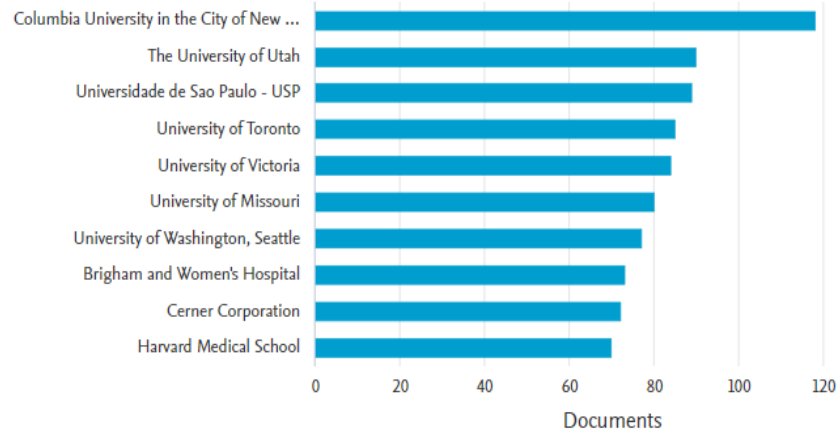

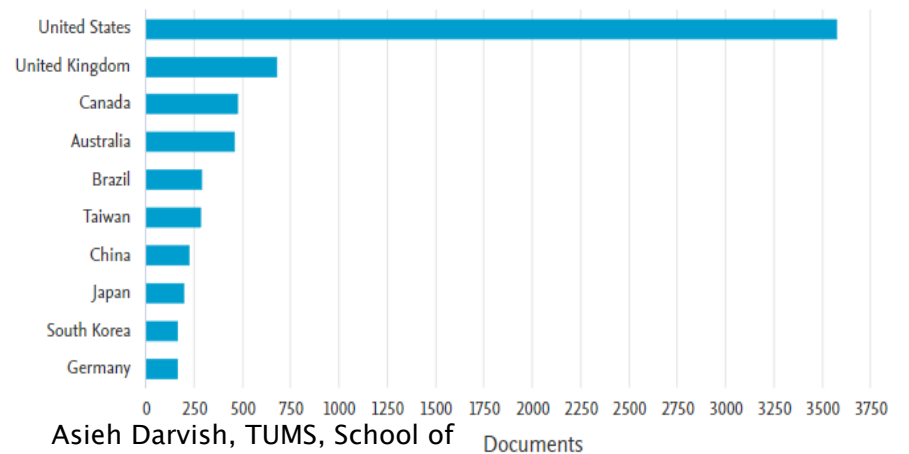# Documents by subject area
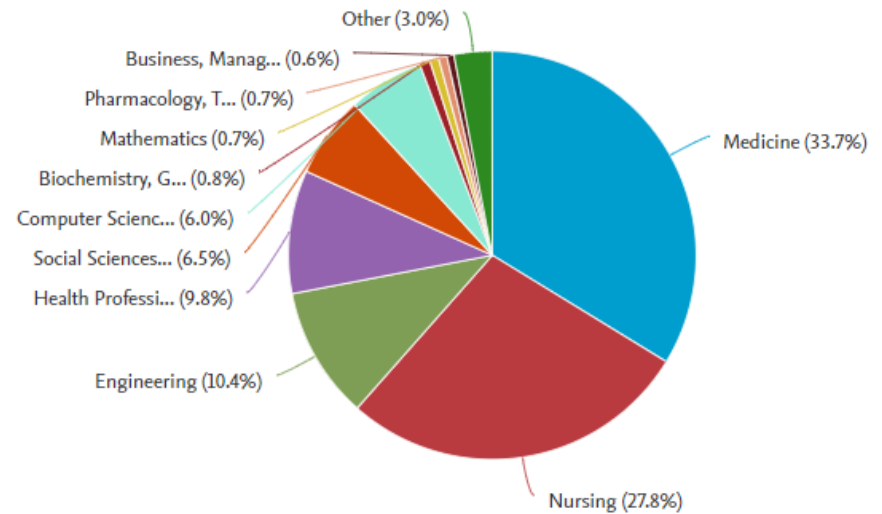
Documents by affiliation

Compare the document counts for up to 15 affiliations.

Documents by country or territory

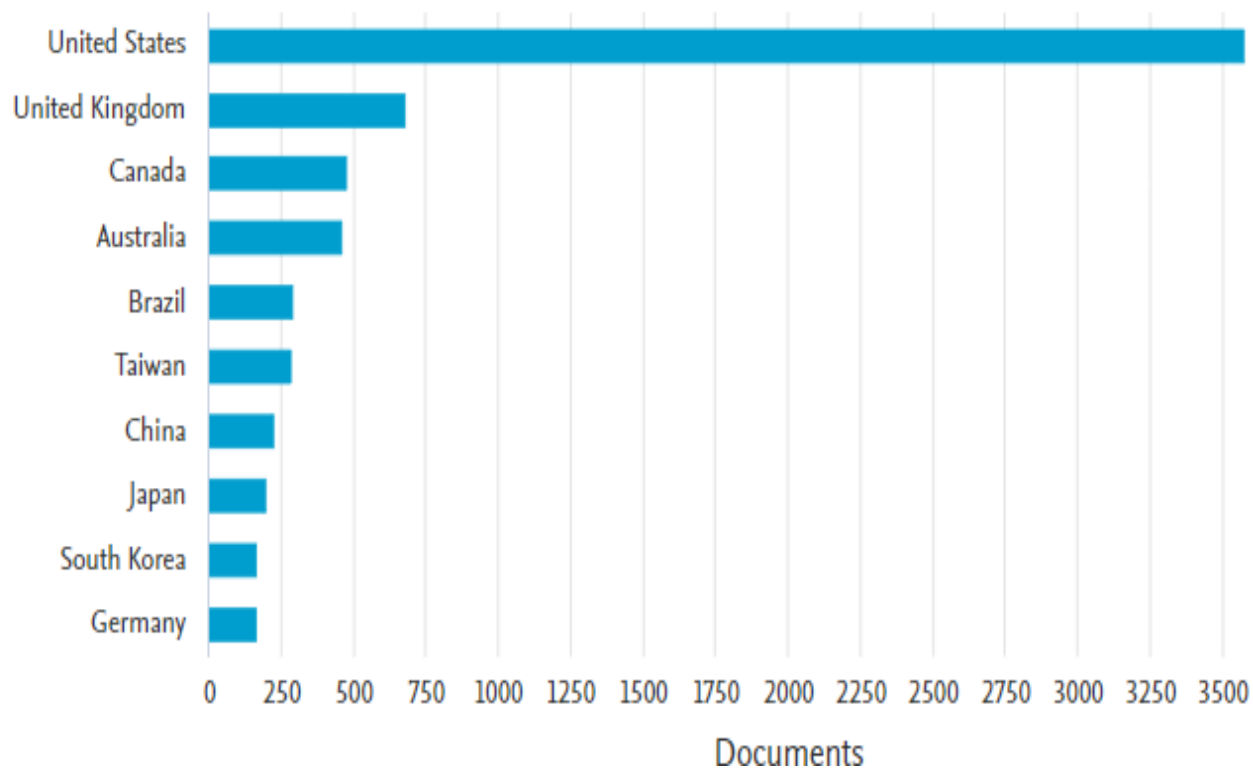Compare the document counts for up to 15 countries/territories.

Scopus

Documents by country or territory

Compare the document counts for up to 15 countries/territories.

Country/Territory ↑	Documents ↓
☐ Finland	156
☐ Sweden	150
☐ Netherlands	132
☐ Spain	115
☐ Norway	102
☐ France	93
☐ India	78
☐ Iran	72
☐ Italy	72
☐ Greece	70

	Document title	Authors	Year	Source
☐ 1	Designing a national model for assessment of nursing informatics competency *Open Access* View abstract ∨ View at Publisher Related documents	Farzandipour, M., Mohamadian, H., Akbari, H., Safari, S., Sharif, R.	2021	BMC Medical Informatics and Decision Making 21(1),35
☐ 2	Attitude of nursing students following the implementation of comprehensive computer-based nursing process in medical surgical internship: a quasi-experimental study *Open Access* View abstract ∨ View at Publisher Related documents	Parvan, K., Hosseini, F.A., Jasemi, M., Thomson, B.	2021	BMC Medical Informatics and Decision Making 21(1),10
☐ 3	Developing a sensor-based mobile application for in-home frailty assessment: a qualitative study *Open Access* View abstract ∨ View at Publisher Related documents	Blinka, M.D., Buta, B., Bader, K.D., (...), McNabney, M., Xue, Q.-L.	2021	BMC Geriatrics 21(1),101
☐ 4	Analysis of embedded medical system and nursing care of pediatric severe infection View abstract ∨ View at Publisher Related documents	Liu, Y., Jin, B., Li, W., Wang, Y.	2021	Microprocessors and Microsystems 83,104003
☐ 5	Electronic health record usability and workload changes over time for provider and nursing staff following transition to new EHR	Dunn Lopez, K., Chin, C.-L., Leitão Azevedo, R.F., (...), Sousa, V., Morrow, D.	2021	Applied Ergonomics 93,103359

Web of Science

- Results: 5,679
  - *(from Web of Science Core Collection)*
- Searched for: TOPIC: (Nursing Information technology) *OR* TOPIC: (Nursing Informatics)
- Timespan: All years.
- Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC.

Publication by Subject

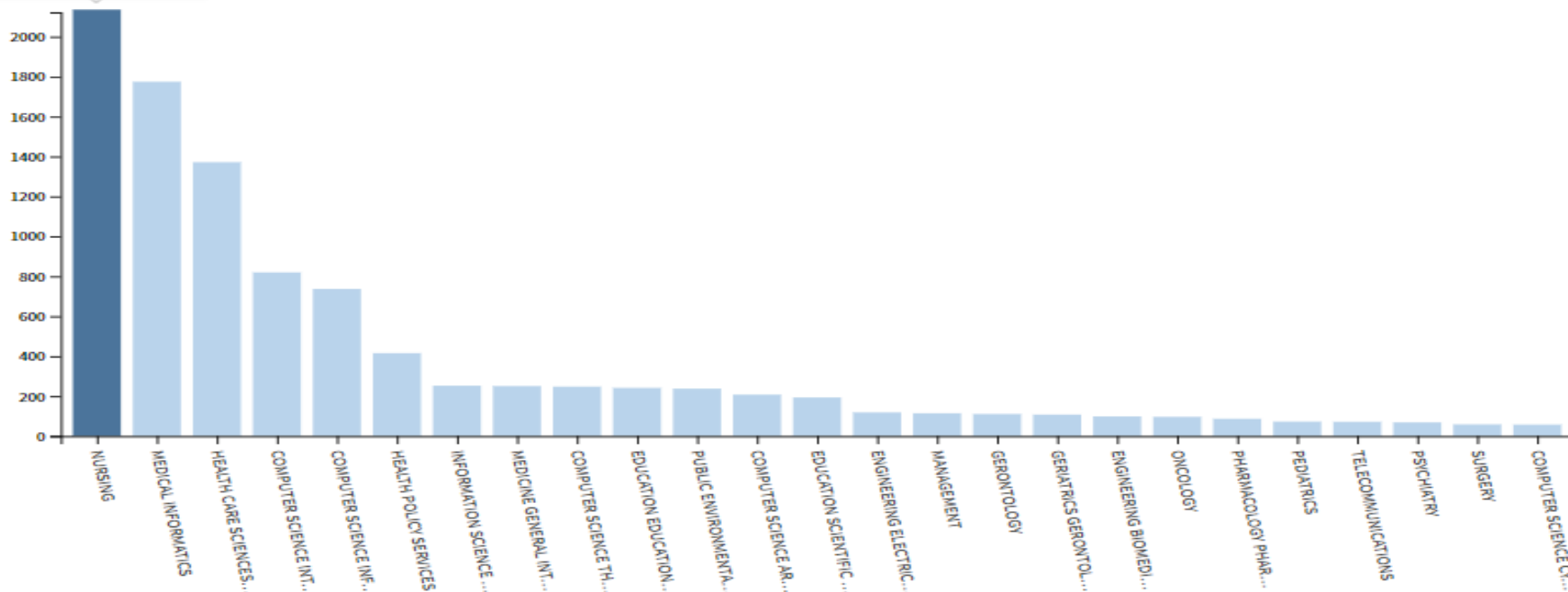| 2,122	×
NURSING	
View Records	

| | raph ▼ | Number of results **25** ▼ | | ⬇ Download | Hide |

Select	Field: Web of Science Categories	Record Count	% of 5,679	Bar Chart
☐	NURSING	2,122	37.366 %	▬▬
☐	MEDICAL INFORMATICS	1,761	31.009 %	▬▬
☐	HEALTH CARE SCIENCES SERVICES	1,358	23.913 %	▬
☐	COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS	806	14.193 %	▬
☐	COMPUTER SCIENCE INFORMATION SYSTEMS	723	12.731 %	▬

Asieh Darvish, TUMS, School of Nursing & Midwifery

Select	Field: Countries/Regions	Record Count	% of 5,679
☐	USA	2,386	42.014 %
☐	ENGLAND	420	7.396 %
☐	AUSTRALIA	407	7.167 %
☐	CANADA	400	7.043 %
☐	BRAZIL	263	4.631 %
☐	TAIWAN	233	4.103 %
☐	PEOPLES R CHINA	172	3.029 %
☐	FINLAND	155	2.729 %
☐	NETHERLANDS	139	2.448 %
☐	SWEDEN	136	2.395 %
☐	GERMANY	135	2.377 %
☐	SPAIN	134	2.360 %
☐	NORWAY	106	1.867 %
☐	SOUTH KOREA	106	1.867 %
☐	JAPAN	97	1.708 %
☐	ITALY	75	1.321 %
☐	IRAN	74	1.303 %
☐	SCOTLAND	73	1.285 %
☐	FRANCE	64	1.127 %
☐	IRELAND	58	1.021 %

Select	Field: Source Titles	Record Count	% of 5,679
☐	STUDIES IN HEALTH TECHNOLOGY AND INFORMATICS	594	10.460 %
☐	CIN COMPUTERS INFORMATICS NURSING	329	5.793 %
☐	INTERNATIONAL JOURNAL OF MEDICAL INFORMATICS	201	3.539 %
☐	NURSE EDUCATION TODAY	121	2.131 %
☐	JOURNAL OF THE AMERICAN MEDICAL INFORMATICS ASSOCIATION	117	2.060 %
☐	JOURNAL OF MEDICAL INTERNET RESEARCH	97	1.708 %
☐	CONSUMER CENTERED COMPUTER SUPPPORTED CARE FOR HEALTHY PEOPLE	93	1.638 %
☐	NURSING INFORMATICS 2016 EHEALTH FOR ALL EVERY LEVEL COLLABORATION FROM PROJECT TO REALIZATION	91	1.602 %
☐	JOURNAL OF ADVANCED NURSING	86	1.514 %
☐	JOURNAL OF CLINICAL NURSING	73	1.285 %
☐	CONNECTING HEALTH AND HUMANS	66	1.162 %
☐	BMC MEDICAL INFORMATICS AND DECISION MAKING	60	1.057 %
☐	NURSING OUTLOOK	57	1.004 %
☐	APPLIED CLINICAL INFORMATICS	56	0.986 %
☐	JOURNAL OF NURSING EDUCATION	54	0.951 %

Publication by Year

Asieh Darvish, TUMS, School of Nursing & Midwifery   3/15/2021   20

Languages

- ☐ ENGLISH (5,561)
- ☐ PORTUGUESE (40)
- ☐ SPANISH (31)
- ☐ GERMAN (21)
- ☐ FRENCH (6)

Publication Years

- ☐ 2021 (27)
- ☐ 2020 (436)
- ☐ 2019 (498)
- ☐ 2018 (436)
- ☐ 2017 (449)

Countries/Regions

- ☐ USA (2,386)
- ☐ ENGLAND (420)
- ☐ AUSTRALIA (407)
- ☐ CANADA (400)
- ☐ BRAZIL (263)

Authors

- ☐ BAKKEN S (47)
- ☐ SARANTO K (34)
- ☐ BORYCKI EM (30)
- ☐ BOWLES KH (30)
- ☐ ALEXANDER GL (29)

Research Areas ▲

- ☐ NURSING (2,122)
- ☐ MEDICAL INFORMATICS (1,761)
- ☐ HEALTH CARE SCIENCES SERVICES (1,505)
- ☐ COMPUTER SCIENCE (1,404)
- ☐ EDUCATION EDUCATIONAL RESEARCH (386)

Source Titles ▲

- ☐ STUDIES IN HEALTH TECHNOLOGY AND INFORMATICS (594)
- ☐ CIN COMPUTERS INFORMATICS NURSING (329)
- ☐ INTERNATIONAL JOURNAL OF MEDICAL INFORMATICS (201)
- ☐ NURSE EDUCATION TODAY (121)
- ☐ JOURNAL OF THE AMERICAN MEDICAL INFORMATICS ASSOCIATION (117)

Web of Science Categories ▲

- ☐ NURSING (2,122)
- ☐ MEDICAL INFORMATICS (1,761)
- ☐ HEALTH CARE SCIENCES SERVICES (1,358)
- ☐ COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS (806)
- ☐ COMPUTER SCIENCE INFORMATION SYSTEMS (723)

Publication By Countries

- USA (2,386)
- ENGLAND (420)
- AUSTRALIA (407)
- CANADA (400)
- BRAZIL (263)
- TAIWAN (233)
- PEOPLES R CHINA (172)
- FINLAND (155)
- NETHERLANDS (139)
- SWEDEN (136)
- GERMANY (135)
- SPAIN (134)
- NORWAY (106)
- SOUTH KOREA (106)
- JAPAN (97)
- ITALY (75)
- IRAN (74)
- SCOTLAND (73)
- FRANCE (64)
- IRELAND (58)

- DENMARK (55)
- PORTUGAL (54)
- SWITZERLAND (53)
- SOUTH AFRICA (52)
- TURKEY (52)
- NEW ZEALAND (51)
- GREECE (50)
- SINGAPORE (47)
- INDIA (45)
- AUSTRIA (37)
- BELGIUM (36)
- SLOVENIA (32)
- ISRAEL (31)
- WALES (31)

- ARGENTINA (28)
- MALAYSIA (28)
- SAUDI ARABIA (28)
- THAILAND (26)
- MEXICO (22)
- JORDAN (18)
- POLAND (18)
- NORTH IRELAND (17)
- PHILIPPINES (14)
- INDONESIA (13)

- KENYA (13)
- CHILE (12)
- PAKISTAN (11)
- ROMANIA (11)
- NIGERIA (10)
- COLOMBIA (9)
- CYPRUS (9)
- EGYPT (9)
- PERU (9)
- CROATIA (8)
- CZECH REPUBLIC (8)
- GHANA (8)

- MOROCCO (8)
- RUSSIA (8)
- TANZANIA (8)
- U ARAB EMIRATES (8)
- ECUADOR (7)
- ICELAND (7)
- JAMAICA (6)
- LEBANON (6)
- LITHUANIA (6)
- OMAN (6)
- ETHIOPIA (5)

- URUGUAY (5)
- BOTSWANA (4)
- CUBA (4)
- DOMINICAN REP (4)
- MALTA (4)
- QATAR (4)
- SRI LANKA (4)
- ZAMBIA (4)
- BANGLADESH (3)
- HUNGARY (3)
- SLOVAKIA (3)
- BOSNIA HERCEG (2)
- BURKINA FASO (2)
- COSTA RICA (2)
- GREENLAND (2)
- GUATEMALA (2)
- IRAQ (2)

- LAOS (2)
- MALAWI (2)
- NEPAL (2)
- PANAMA (2)
- SERBIA (2)
- UGANDA (2)
- UKRAINE (2)
- VIETNAM (2)
- BAHRAIN (1)
- BULGARIA (1)
- CAMBODIA (1)
- CAMEROON (1)
- CAPE VERDE (1)
- GAMBIA (1)
- KUWAIT (1)
- LATVIA (1)

Visualizing Scientific Landscape

▸ https://www.vosviewer.com

Van Eck, N.J., & Waltman, L. (2014). Visualizing bibliometric networks. In Y. Ding, R. Rousseau, & D. Wolfram (Eds.), *Measuring scholarly impact: Methods and practice* (pp. 285-320). Springer.

Web of Science

- clustering, illustrating, keyword frequency, co-authoring networks, citation analysis, …

- In this study, the occurrence of keywords in published resources that have been repeated at least 10 times was investigated

- The number of authors: 10133

- The number of Countries: 91

- The most No. of Published articles: 42% USA

(7 clusters):

Cluster 1 (85 items)
adherence
blood pressure
burden
cancer
chronic disease
chronic illness
clinical outcome
collection
computer technology
confidence
confidentiality
consumer
cost effectiveness
cost saving
counseling
diagnosis
disease control
e mail
efficacy
ehealth
email
emergency department
equipment
exception

failure
family member
feasibility
frequency
health education
health outcome
health service
idea
illness
infection
installation
internet
internet access
investment
labor
loss
medicare
older adult
older person
pain
parent
patient education
patient satisfaction
pediatric
physician assistant

policy maker
potential benefit
primary care
primary care practice
primary care provider
primary outcome
privacy
public health
public health nurse
radiology
real time
referral
reimbursement
reminder
response rate
rns
screening
security
self efficacy
self management
sensitivity
smartphone
social support
social worker
surgeon

symptom
telehealth
telemedicine
telephone
therapy
timeliness
timing
uncertainty
valuable information
variability
web site

Cluster 2 (64 items)
accuracy
acute care setting
adverse drug event
adverse event
alert
bedside
bedside nurse
clinical decision support
clinical decision support
community hospital
computerized physician
computerized provider
cpoe

critical care
death
demonstration
deployment
economic
ehr
ehr adoption
ehr system
electronic documentatio
electronic medical recor
electronic medication ac
emr
error
flexibility
frustration
hardware
harm
health care quality
healthcare organization
high risk
implementation process
long term care facility
meaningful use
medical error
medical record

medication
medication administratio[n]
medication error
medication safety
nurse manager
nurses perception
nursing home
nursing homes
nursing staff
outcome measure
patient data
patient information
productivity
prototype
quality outcome
redesign
reduction
reporting
response time
similarity
successful implementati[on]
surveillance
unintended consequen[ce]
vendor
workflow

workload

Cluster 3 (48 items)
clinical environment
clinical experience
clinical relevance
computer skill
content
decision support system
distance education
dnp
education
educational program
educator
evolution
genomic
growth
health informatic
health profession
informatics
informatics competency
informatics knowledge
informatics nurse
informatics nurse specia[list]
informatics skill
informatics tool

information literacy
information managemen[t]
instructor
knowledge
leadership
learning
novice
nursing
nursing curriculum
nursing education
nursing informatic
nursing informatics
nursing informatics rese[arch]
nursing practice
nursing profession
nursing program
nursing science
online
responsibility
rural area
specialty
teaching
transformation
workforce
world wide web

Cluster 4 (39 items)
applicability
artifact
big data
biomedical informatic
care coordination
care plan
care team
clinical workflow
continuity
continuum
direct patient care
end user
framework
health care delivery
health care setting
health information exch[ange]
healthcare delivery
home health agency
information need
international classificati[on]
interoperability
mapping
nurse leader
nursing diagnosis

nursing documentation
nursing knowledge
nursing terminology
patient engagement
personal health record
possibility
pressure ulcer
qualitative data
representation
skilled nursing facility
standard
translation
trust
veterans affairs
workplace
Cluster 5 (21 items)
acceptance
accessibility
attitude
clinical practice
consistency
convenience sample
ease
educational intervention
effective use

mean score
mobile device
mobile technology
pda
personal digital assistan
positive attitude
positive impact
pre
reliability
scale
technology acceptance
usefulness
Cluster 6 (11 items)
core competency
future direction
health professional
health professions educ
healthcare professional
interdisciplinary team
principle
psychinfo
scopus
simulation
willingness
Cluster 7 (7 items)

Cluster 7 (7 items)
collaboration
high quality
initiative
qsen
quality improvement
safety education
teamwork

Co-occurrence network of authors keywords

Distribution of Repeated Keywords by Year

The process of transformation of the most frequent keywords by year

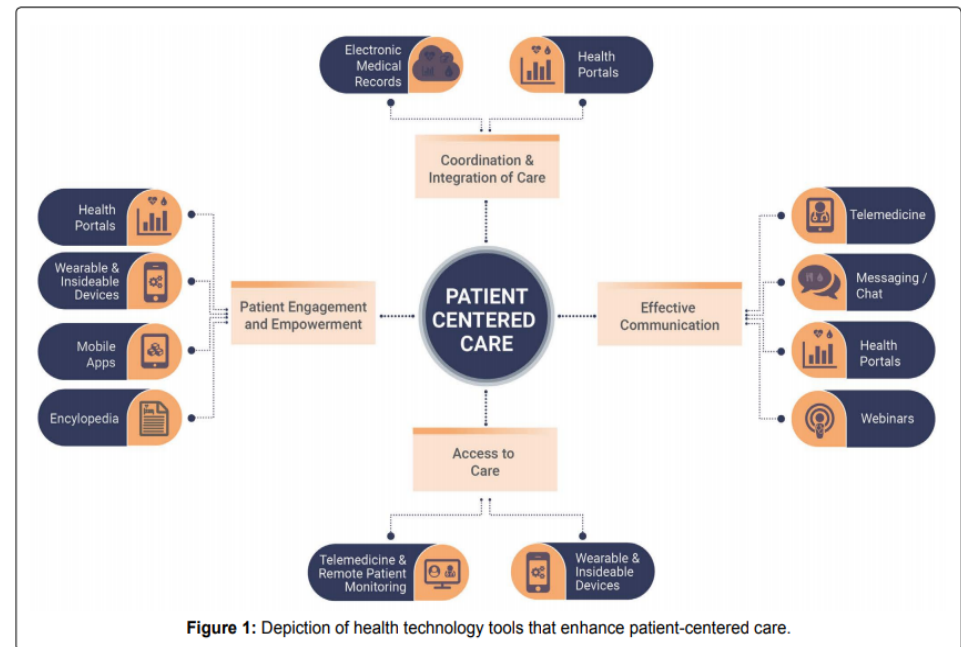|					
attitude to computers, Information System, practice, patient, hospitals, Internet, knowledge, training, decision making, distance education, intensive care, medical informatics	Information technology, health informatics, Nursing informatics, information systems, Hospital Information , informatics, cancer, nurse education	Clinical practice, self efficacy, telecare, e-learning, quality improvement, RFID, healthcare, educational technology, nursing information system, multimedia, learning, curriculum, Palliative care, telemedicine, midwifery, Quality of care, nursing students	Telehealth, Telenursing, workflow, Nursing home, nursing care, safety, long-term care, patient safety, privacy, health education, EHR, EMR, implementation , aged, nursing documentation	SIMULATION, Systematic review, Health information technology, selfcare, primary health care, EHR, INNOVATION	Social media, elderly, Mhealth, Mobile health

Paradigm Shift

Information systems and HCI → Education and Care quality → Telecare and self-care

1986 ─────────────────→ 2021

Trends in the Digital Health Landscape Today

Patient-Centeredness

- e-Patients, e-Physicians and smart hospitals
- Teleconsultation and remote patient monitoring
- Web as the source of health information
- Webinars
- Wearable sensors
- Insideable devices
- Electronic Medical Records (EMR)
- Health portals
- The human genome project
- Personalized and precision medicine
- 3D Printing
- Artificial intelligence in healthcare

Figure 1: Depiction of health technology tools that enhance patient-centered care.

Al Muammar et al. Int Arch Public Health Community Med 2018, 2:015   • Page 5 of 8 •

Al Muammar AM, Ahmed Z, Aldahmash AM. Paradigm Shift in Healthcare through Technology and Patient-Centeredness. Int Arch Public Health Community Med. 2018;2:015.
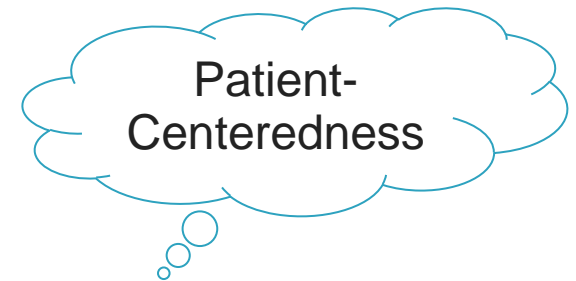
A comparative study

▸ The leading countries in nursing informatics were selected by determining the top countries with the highest number of articles published in the field of nursing informatics.

▸ The principles of the TIGER international project as indicators were reviewed in the literatures of Iran and selected countries and compared with the comparative matrix.

▸ The results showed that Iran with 15 years of activity in the field of nursing informatics is new and the United States with a history of 60 years of activity in this field has been the most pioneer

Nursing informatics development by country

- USA

- United Kingdom

- Canada

- Australia

- Taiwan

The Principles of TIGER

▸ Tiger International Project, in collaboration with IT, medical and nursing professionals around the world, has taken important steps in the field of planning to empower nurses in IT over the past twenty years

Seven Pillars:

▸ Management and Leadership

▸ Education

▸ Communication and cooperation

▸ Informatics design

▸ Information technology

▸ Policy-making

▸ Culture

Darvish A, et al, Investigation and comparison of Nursing Informatics development factors in Iran and selected countries : a comparative study, IJNR. 2021; 15(6): 10-28.

Digital natives and digital immigrants

the differences between
- Digital Natives: Those individuals who were born and grew up speaking the language of computers, the Internet, and video games

- Digital Imigrants: Those who were not born in the digital world but at some point in their lives have acquiesced or have adopted to the emerging postmillennial digital culture

Repique RJ. Digital natives, digital immigrants: dichotomy or diversity in psychiatric nursing. J Am Psychiatr Nurses Assoc. 2013 Mar 1;19(2):100-1.

Role of Nursing leaders

▸ **Informatics Nurses Forge Ahead in Changing World of Healthcare**

Role of Nursing leaders: Merge competencies to

▸ **Nursing Process**

▸ **Education**

▸ **Shared Vision**

▸ **Collaboration**

▸ **Communication**

▸ **Change Management**
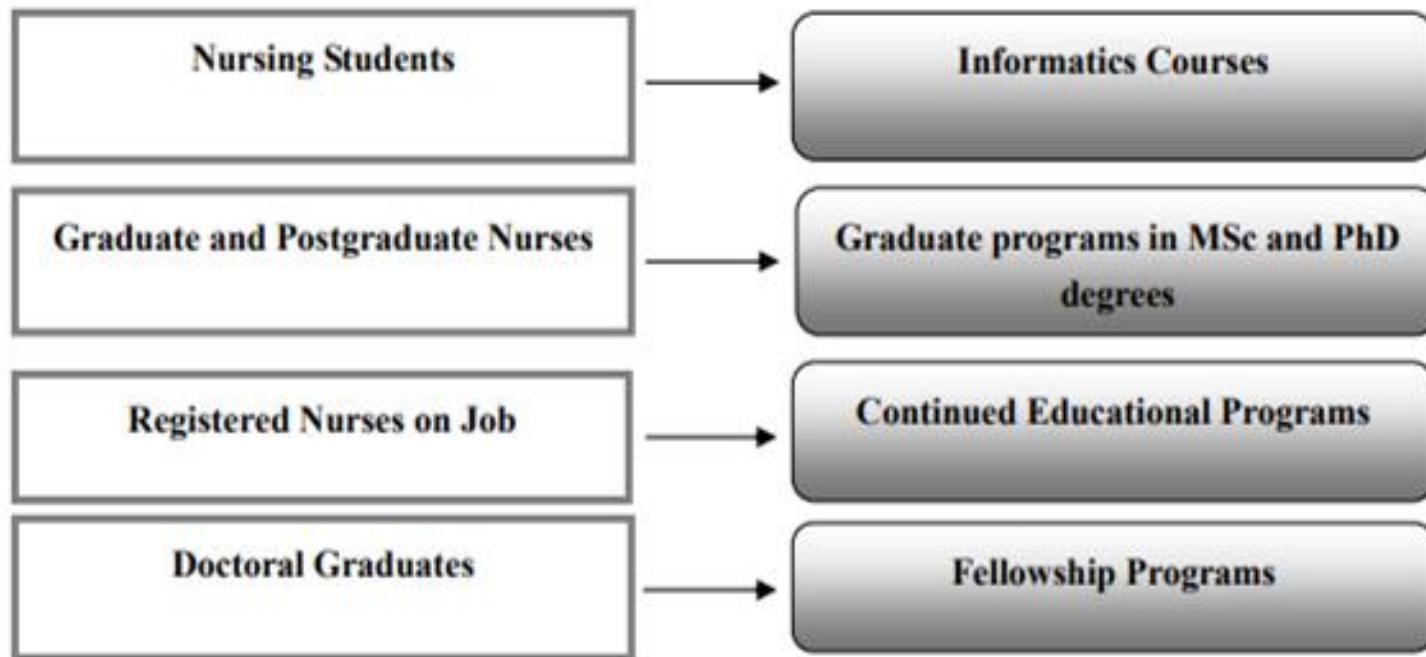
Development of different NI courses

Figure 1. The proposed educational model for empowering nurses on the subject of nursing informatics in four groups

Darvish A, Bahramnezhad F, Keyhanian S, Navidhamidi M. The role of nursing informatics on promoting quality of health care and the need for appropriate education. Global journal of health science. 2014 Nov;6(6):11.

"Health is not only to be well –
But to use well every power we have"

Florence Nightingale 1893

Early nursing icons such as Florence Nightingale left a legacy of energy, vision and activism that lives on in nurses today

References

▸ Risling T, Strudwick G, Booth R. Researching Nursing Informatics in a Digital Age. InIntroduction to Nursing Informatics 2021 (pp. 317-338). Springer, Cham.

▸ Booth R, Strudwick G, McMurray J, Chan R, Cotton K, Cooke S. The Future of Nursing Informatics in a Digitally-Enabled World. InIntroduction to Nursing Informatics 2021 (pp. 395-417). Springer, Cham.

▸ Sackett K, Jones J, Erdley WS. Incorporating healthcare informatics into the strategic planning process in nursing education. InNursing leadership forum 2005 Apr 1 (Vol. 9, No. 3, p. 98). Springer Publishing Company.

▸ Parker JL, Abbott PA. The new millennium brings nursing informatics into the OR. AORN journal. 2000 Dec 1;72(6):1011-7.

▸ Currie LM. Evaluation frameworks for nursing informatics. International Journal of Medical Informatics. 2005 Dec 1;74(11-12):908-16.

▸ Darvish A, Bahramnezhad F, Keyhanian S, Navidhamidi M. The role of nursing informatics on promoting quality of health care and the need for appropriate education. Global journal of health science. 2014 Nov;6(6):11.

- Darvish A, et al, Investigation and comparison of Nursing Informatics development factors in Iran and selected countries : a comparative study, IJNR. 2021; 15(6): 10-28.

- Darvish A, Salsali M. A review on information technology development and the necessity of nursing informatics specialty. InINTED2010 Proceedings 2010 (pp. 3320-3324). IATED.

- Ball MJ, Hannah KJ, Newbold SK, Douglas JV. Nursing informatics: Where caring and technology meet. AJN The American Journal of Nursing. 1996 Dec 1;96(12):16N.

- Saba VK. Essentials of Nursing informatics: 2011.

- Hunter KM, McGonigle DM, Hebda TL. TIGER-based measurement of nursing informatics competencies: the development and implementation of an online tool for self-assessment. Journal of Nursing Education and Practice. 2013 Dec 1;3(12):70.

- Hebda T, Czar P, Mascara C. Handbook of informatics for nurses and health care professionals. Pearson Prentice Hall; 2009.

Thanks