Division of **Care Innovation**

Department of **Robotics Nursing**

Supported by Molten Co., Ltd.

Associate Professor, Gojiro Nakagami *PhD, RN* April 2020–Present
Project Professor, Taketoshi Mori *PhD* April 2017–March 2020
Current: Next Generation Artificial Intelligence Research Center, The University of Tokyo, Professor
Project Senior Assistant Professor, Hiroshi Noguchi *PhD* April 2017–March 2020
Current: Department of Smart Sensing, Graduate School of Engineering, Osaka City University, Associate Professor
Assistant Professor, Aya Kitamura *PhD, RN* April 2020–Present
Project Assistant Professor, Toshiaki Takahashi *PhD, RN* April 2017–Present
Research Associate, Shiho Higashimura *PhD, RN* April 2020–Present

Collaborator

Professor, Hiromi Sanada *PhD, RN, WOCN, FAAN* April 2017–Present

Aims and Achievements

In order to promote the community-based integrated care system, it is important to create an environment where older adults can live happily and independently in the community despite having a variety of chronic diseases. In particular, physical condition management including daily vital sign monitoring, prevention of symptoms and conditions that threaten the quality of life of those individuals, and promotion of healing are essential care for the continuation of life at home. In other words, daily monitoring of physical condition, prevention and management of wounds, and support for comfortable elimination are important in home healthcare. In order to meet these needs, Department of Robotics Nursing was established with the aim of creating a methodology for providing a wide range of life support by utilizing robotics technology, based on natural sciences such as engineering, science, and informatics, from the development of a nursing approach that enables intervention based on the clarification of the actual conditions and mechanisms of signs and symptoms caused by daily life.

For predicting and preventing various signs and symptoms caused by human daily life activities, we have been promoting research to develop advanced monitoring and preventive care systems based on the elucidation of their causes. We have been working on clinically adaptable manufacturing through 3D rapid prototyping, design development, fabrication, and testing, as well as system development using data science technologies such as Big Data analysis, Artificial Intelligence (AI), and Augumented Reality (AR). In particular, the need of the day is to create an environment where people can receive quality care no matter where they are, and the promotion of remote nursing is a key issue. We are promoting research with the aim of bringing digital transformation to the nursing field and promoting higher quality home health care and nursing.

So far, Department of Robotics Nursing has created the Care Innnovation described in the next section, and has achieved 20 original papers in English, 5 awards, and 5 research grants. In particular, we have received a grant from the Ministry of Health, Labour and Welfare for the promotion of health care services for the elderly, and have developed a project to apply cutting-edge robotics technology to actual clinical practice.

Contribution to Care Innovation

Care Innovation in Department of Robotics Nursing includes: 1. development of an automatic classification system based on AI analysis of wounds; 2. promotion of a telemedicine system using a teleconsultation system; 3. prediction of patient outcomes using machine learning analysis of big data such as electronic medical record data and nurse call logs; 4. creation of algorithms for simple monitoring and estimation of living patterns and their changes in daily living environments using communication robots; and 5. development of bedside biometric monitoring and estimation systems and robotic mattresses for the prevention of pressure injuries, etc. We have been engaged in development research rooted in clinical practice.

These Care Innovations can be summarized in Figure 1. In the smart healthcare home, AI will recommend the necessary care based on data obtained from non-invasive, non-restriction sensing and biosensors, and the necessary care will be provided by visiting nurses. The vision of the future society is that older individuals will be able to live a happy, independent and autonomous life until the end of their lives by utilizing such a system. We believe that by combining our robotics technologies, we will be closer to realizing this smart healthcare home concept.

Fiture1. Care Innovations in Department of Robotics Nursing

1. In the development of an automatic wound classification system using AI, we conducted research on skin-tears, which often occur in older adults. Skin-tears are also called skin lacerations, and are extremely painful wounds in which the surface layer of the skin peels off due to weak external force applied to skin that has become extremely fragile due to aging, photoaging, or underlying diseases and their treatment. In order to provide appropriate treatment, it is necessary to properly assess the severity of the wound, but this is difficult for nurses without sufficient experience. Therefore, we have devised a method to automatically classify the severity of the wound by introducing AI into image analysis. Based on the extent, shape, and color tone of the wound obtained from digital camera images, we succeeded in estimating the STAR Classification, an international classification of skin-tears, with high accuracy[1].

2. In the tele-consultation system for severe pressure injuries, when a home care nurse provides pressure injury care, a nurse certified in wound, ostomy, and continence management provides advice on care (tele-consultation) via video call using a newly developed application, and the system was shown to promote pressure injury healing. Furthermore, in order to be able to communicate expert techniques during consultation, we developed and implemented a system that can remotely depict expert techniques using AR technology[2].

3. In the big data analysis, we estimated the social impact of pressure injuries by analyzing the database of DPC hospitals nationwide, and conducted joint research with the Department of Healthcare Information Management at The University of Tokyo Hospital to construct a system that automatically predicts the occurrence of pressure injuries in hospitals. In the analysis of the DPC database, we reported that the probability of discharge to home was low due to the occurrence of pressure injuries during hospitalization[3]. In addition, in a study to predict the occurrence of pressure injuries, we have reported that pressure injury occurrence during hospitalization could be accurately predicted by supervised machine learning using data entered by nurses in daily clinical practice that could be collected on the first day of hospitalization[4]. Furthermore, the feature importance calculated using eXtreme Gradient Boosting, which is the classifier with the highest prediction accuracy, showed that in addition to general ADL indicators, there were items that can be observed by nurses and have not been included in risk assessment scales in the past, such as whether the patient has an appetite, indicating that the use of AI can deepen the understanding of predicting the occurrence of pressure injries.

4. As for the use of communication robots, we have implemented a system that automatically links self-care devices such as blood pressure monitors and thermometers with communication robots, aiming to promote self-care behavior and predict changes in daily life. The data obtained through these efforts will be stored in a database and further used to predict user outcomes as new big data in the field of nursing. In addition, when introducing a communication robot into actual clinical practice, it is necessary to understand what kind of robot is suitable for what kind of subject. So far, we have applied communication robots to university hospitals and elderly care facilities, and it has become clear that their characteristics differ between those that are effective and those that are not[5,6]. Therefore, we developed an algorithm for the adaptation of communication robots through interviews and participant observation in clinical settings[7]. As a further application of robotic technology, we implemented a system using newme (avatarin Co., Ltd.), a tele-communication robot, which can be operated remotely by a medical practitioner to support care by communicating with the patient as if he or she were at his or her side. The most significant difference between this system and videoconferencing is that the operator can move the wheeled robot to communicate while looking at each other's face, and can talk while moving. It was suggested that the introduction of this robot into palliative care and rehabilitation settings would be useful in maintaining the quality of care and reducing the risk of infection, even in situations where face-to-face care is difficult.

5. We have jointly developed a robotic mattress (LEIOS, Molten Co., Ltd.) for the prevention of pressure injuries, which enables assessment of the risk of pressure injuries based on body pressure measurement data 24 hours a day, prevention of pressure injuries by automatically adjusting the optimal air cell pressure, and continuous monitoring of body movement and sleep state using center of gravity transition data[8].

Like those examples, Department of Robotic Nursing has been practicing the creation of new care innovations to improve the wellbeing of the subject and support the provision of higher quality and more efficient nursing care through automatic processing of data based on sensoring by devices and machine learning.

Link to the Mission of GNRC

In this department, we aim to establish a model for the development and implementation of robotics technology that integrates engineers, nursing researchers, and clinical practice. In particular, in addition to the integration of different disciplines, it is important to create a system that can be truly implemented in society by clarifying the events that serve as barriers to advanced technology taking root in clinical practice. In order to train the next generation of researchers, young faculty members are participating in robotics research projects. Through this participation, they are able to experience the process of implementing their research into society by communicating with collaborators from companies and clinical sites in different fields and participating in development and implementation. We have been also engaged in promoting data science, AI, and robotics technologies to nursing researchers through seminars at academic conferences and introductory seminars on nursing science and engineering organized by GNRC.

In this way, we are contributing to the achievement of the mission of the GNRC by fostering young researchers who practice robotics nursing and promoting outreach activities to publicize robotics technology.

Future Directions

In the four years since the establishment of GNRC, department of Robotics Nursing field has promoted numerous innovations. On the other hand, with the global spread of COVID-19, the promotion of remote nursing based on digital transformation has been increasingly accelerated, and it can be said that social transformation is outpacing technological innovation. The widespread use of robotics technology in nursing is still limited due to the lack of human resources in clinical practice who can use the most advanced technology, and the lack of truly user-friendly and highly effective systems without complicated procedures. In the field of robotics nursing, we will continue to develop cutting-edge technologies that can be easily used by anyone in order to further promote remote nursing. In particular, AI and AR are keys for introducing them into clinical practice as the next generation of nursing technology. By letting AI learn outstanding nursing knowledge and using AR to pass on the skills, it will be possible to leave behind the nursing skills of experts (Fig. 2). We hope to pioneer the future of nursing practice using robotics technology. We are currently developing a next-generation nursing skill transfer system with support from The University of Tokyo's Institute for AI and Beyond and AMED.

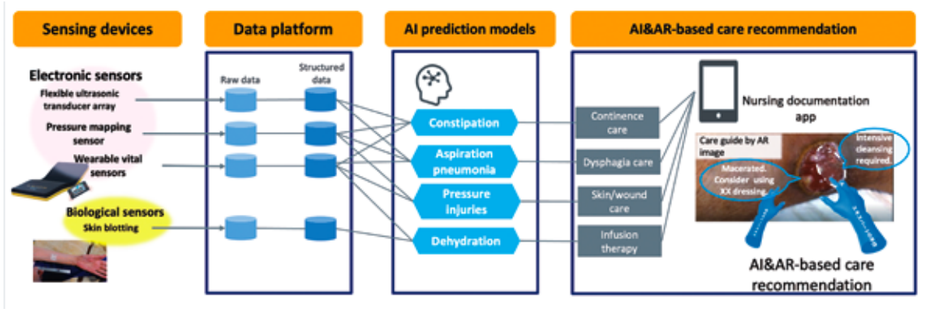


Figure 2. Care Recommendation System based on AI and AR

References

1. Nagata T, Noyori S, Noguchi H, Nakagami G, Kitamura A, Sanada H. Skin tear classification using machine learning from digital RGB image. J Tissue Viability. 2021. doi:https://doi.org/10.1016/j.jtv.2021.01.004
2. Sanada H, Nakagami G, Matsumoto M, Takahashi T, Kitamura A, Higashimura H. A Report of Ministry of Health, Labour and Welfare Research Grant for the Promotion of Health Care for the Elderly “Project to verify the effectiveness of using robot technology in home visitation services” . March 2021.
3. Nakagami G, Morita K, Matsui H, Yasunaga H, Fushimi K, Sanada H. Association between pressure injury status and hospital discharge to home: A retrospective observational cohort study using a national inpatient database. Ann Clin Epidemiol. 2020;2(2):38-50.
4. Nakagami G, Yokota S, Kitamura A, Takahashi T, Morita K, Noguchi H, Ohe K, Sanada H. Supervised machine learning-based prediction for in-hospital pressure injury development using electronic health records: A retrospective observational cohort study in a university hospital in Japan. Int J Nurs Stud. 2021;119:103932. doi:10.1016/j.ijnurstu.2021.103932.
5. Koyano Y, Noguchi H, Sanada H. Can the use of a human-shaped communication robot enhance motivation for inpatient rehabilitation? J Nurs Sci Eng. 2020;7:170-76.
6. Noguchi H, Koyano Y, Mori H, Komiyama C, Sanada H, Mori T. Exploration of communication robot use for older patients in an acute hospital based on case trials. J Nurs Sci Eng. 2019;6(2):70-82.
7. Nakayama E, Takahashi T, Kitamura A, Noguhchi H, Nakagami G, Kuwata M, Shidare M, Sanada H. Factors related to introduction and continuous use of communication robots for patients with symptoms of dementia from view of staff in a long-term care hospital. J Nurs Sci Eng. 2020;7:116-29
8. Saegusa M, Noguchi H, Nakagami G, Mori T, Sanada H. Evaluation of comfort associated with the use of a robotic mattress with an interface pressure mapping system and automatic inner air-cell pressure adjustment function in healthy volunteers. J Tissue Viability. 2018;27(3):146-52.

Awards

1. JANS40 Award. Takahashi T, Murayama R, Nakagami G, Abe M, Matsumoto M, Sanada H. Development of an AI-based care recommendation system using ultrasound images to prevent peripheral intravenous infusion problems. 40th Conference of Japan Academy of Nusing Science. 2020.
2. 8th Conference of the Society for Nursing Science and Engineering Research Encouragement Award. Noyori S, Nagata T, Noguchi H, Nakagami G, Kitamura A, Sanada H. Development of an automatic estimation method for skin-tear severity: A machine learning approach. 8th Conference of the Society for Nursing Science and Engineering. 2020.
3. 8th Conference of the Society for Nursing Science and Engineering Society Award. Koyano Yuiko, Nakagami Gojiro, Tamai Nao, Sugama Junko, Sanada Hiromi. Morphological characteristics of skin tears to estimate the etiology-related external forces that cause skin tears in an elderly population. Journal of Nursing Science and Engineering. 2020;7:68-78.
4. 26th Conference of Japanese Society of Wound, Ostomy & Continence Management Excellence Award. Mori T, Araki D, Noguchi H, Ono K, Sanada H. Automatic DESIGN-R depth and size estimation based on machine learning of pressure ulcer digital camera images. 2018
5. 26th Conference of Japanese Society of Wound, Ostomy & Continence Management President Award. Nakagami G, Koyanagi H, Sasaki S, Sanada H. Risk factors of pressure ulcer development based on severity in patients at high risk of developing pressure ulcers under incentive system at a university hospital. Journal of Japanese Society of Wound, Ostomy and Continence Management, 2018;22(2),164.

Competitive Research Fundings

1. 2020 Ministry of Health, Labour and Welfare Research Grant for the Promotion of Health Care for the Elderly. Project to Verify the Effectiveness of Using Robot Technology in Home Visitation Services. PI: Hiromi Sanada.
2. 2020 JSPS KAKENHI Grant-in-Aid for Scientific Research (A). Grant Number 20H00560. Development of Non-invasive Liquid Assessment Technology for Realization of Smart Home Care Concept. PI: Hiromi Sanada.
3. 2019 JSPS KAKENHI Grant-in-Aid for Exploratory Research. Grant Number 19K22742. Self-learning system for puncture technique for new nurses using AR technology. PI: Hiromi Sanada.
4. 2017 JSPS KAKENHI Grand-in-Aid for Scientific Research (C). Grant Number 17K01554. A handheld scanner for 3D assessment of extremities available at the bedside. PI: Hiroshi Noguchi
5. 2017 JSPS KAKENHI Grant-in-Aid for Scientific Research for Young Scientists (Start-up). Grant Number 17H06646. Verification of Positioning of a Robotic Mattress for Comfort in Pressure Ulcer Management. PI: Aya Kitamura.

Division of **Care Innovation**

Department of **Biological Nursing**

Supported by Saraya Co., Ltd.

Project Associate Professor, Takeo Minematsu *PhD* April 2017–Present
Project Senior Assistant Professor, Nao Tamai *PhD, RN, PHN* April 2017–March 2019
Current: Department of Visualized Nursing, Project Associate Professor
Misako Dai *PhD, RN, PHN* April 2019–Present
Assistant Professor, Yuko Mugita *PhD, RN, PHN* April 2017–Present
Postdoctoral Fellow, Mayu Fukuda *PhD, RN* April 2017–March 2018
Current: Yokohama Municipal University, Assistant Professor,
Tamae Urai *PhD, RN* April 2017–March 2018
Current: Toyama Prefectural University, Senior Assistant Professor
Sofoklis Koudounas *PhD* April 2019–Present
Laboratory Technician, Sanai Tomida April 2017–Present

Collaborative Department

Professor, Hiromi Sanada *PhD, RN, WOCN, FAAN* April 2017–Present
Associate Professor, Gojiro Nakagami *PhD, RN* April 2017–Present

Aims and Achievements

Nursing aims to maximize the performance of patients' self-healing capacity by managing their environment and systemic and local conditions. For this purpose, biological and cultural approaches must be the twin pillars of nursing. Although the importance of biological studies is recognized worldwide, most of them are clinical studies using physiological indicators. Globally, nursing studies based on basic biological research are rare.

The aim of this department is to establish biological nursing, which is a new methodology of nursing science based on basic biological research. We are conducting a series of model studies including the following [1]. Reproduction of clinical problems by using experimental animals or cell cultures [2]. Observation from the individual level to organ, cellular, and molecular levels. The hypothesis for the problems will be proposed in this step [3]. Testing the hypothesis by molecular biological and biochemical methods. This contributes to understanding the true nature of the problem, and identifying a new care target [4].Translation of the findings to clinical studies to show applicability, validity, and efficacy. The result of this process is the development of new nursing technologies.

Our main research topics are skin disorders, such as pressure ulcers, and systemic conditions, such as dehydration, which closely relate to patients' daily life and care. We conducted model studies, including basic research, using cell cultures and experimental animals, as well as clinical research.

Our findings were cited in 29 English papers, a Japanese paper, 24 presentations in international conferences, and 36 presentations in national conferences. Five presentations at international conferences were awarded prizes, as well as four presentations at national conferences.Furthermore, we have applied for 4 patents based on our findings.

Contribution to Care Innovation

Our department focuses on the development of comprehensive care for vulnerable skin or wounds due to aging and disease in collaboration with the Department of Skincare Science and the Department of Gerontological Nursing/Wound Care Management. The skin is a unique organ in the sense that we can directly see and touch it. Because several sensory systems are distributed throughout the skin, skin disorders have both physical and mental consequences. Therefore, the health of skin, which is maintained by appropriate skin care, is fundamental for a healthy life, and care that promotes rapid healing is required for wounds. Wound blotting is a non-invasive wound assessment technique that contributes to daily wound care by nurses (Minematsu et al., 2013). The choice of the appropriate care is essential for wound management. Conventionally, biopsy sampling is the gold standard method for the pathophysiological examination of wounds, but a daily biopsy sampling is impossible due to bleeding and pain. We have developed a non-invasive and simple wound blotting technique to analyze the components of wound exudates that reflect the pathophysiology of wounds. Blotting is a technique to affix negatively charged molecules to the positively charged blotting membrane. Following wound cleansing, components of the exudate were fixed on the blotting membrane by a 10-sec attachment on the surface of wound, and qualitatively and quantitatively analyzed by chemical or immunological methods. In the wound blot examination of full-thickness wounds in mice, an inflammation marker (tumor necrosis factor, TNF) and a healing marker (collagen, type 4, COL4) were detected according to the progress of healing, and the signal intensities were reflected in their concentration in the exudate (Fig. 1). These findings suggested that daily wound care, based on pathophysiological examination, was possible by wound blotting.

We have reported research where we identified the biomarkers showing the pathophysiological conditions and predicting the prognosis of wounds, as well as clinical studies confirming the validities of biomarkers (Minematsu et al., 2018; Kitamura et al., 2019).

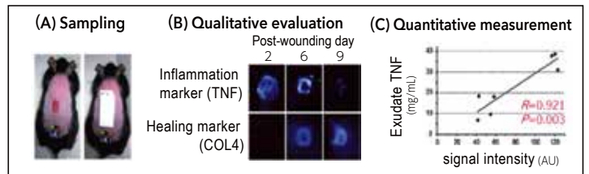


Figure 1. Wound blot examination in mouse full-thickness wounds

(A) Collection of wound exudates by blotting. (B) Detection of markers for inflammation and healing of wounds. (C) Correlation between TNF signal intensity in wound blot examination and concentration of exudate TNF (modified from Minematsu et al. 2013).

Among them, the wound blot examination for biofilm has potential to bring a breakthrough in wound management. Biofilm is a bacterial community enveloped in viscous matrices, in which bacteria acquire the tolerance to the host' s immune system and antibacterial reagents. Biofilm is a major cause of colonization which is a local wound infection without clinical signs. We developed wound blotting examination for biofilms through the international collaboration with Prof Schultz, University of Florida (Astrada et al., 2020).

This revealed the inhibitory effect of biofilms on wound healing (Nakagami et al., 2017) and enhanced wound healing by biofilm removal (Mori et al., 2019). Finally, we commercialized a kit to detect biofilm within two minutes through the collaboration with Saraya Co, Ltd in January 2019. This product, which visualizes the invisible biofilm, was a novel innovation in the research and practice of wound management.

Skin blotting is also part of our unique technology, which was derived from wound blotting. The skin protects the body by acting as a barrier and it intercepts the transmission of water and electrolytes. Skin blotting temporarily disrupts the skin barrier function, and extracts biomarkers after 10 minutes of attachment with the blotting membrane to the surface of the skin (Minematsu et al., 2014; Fig. 2). Although this is originally a skin assessment technique, we recently applied it to the evaluation of a systemic condition such as dehydration.

Chronic dehydration without clinical signs spreads in older adults. Dehydration is a premonitory symptom of heat stroke, and a risk factor of decreased ADL and cognitive impairment in older adults. Although early detection and early intervention are required for maintaining and improving the health condition of older adults, there are no examinations applicable for their daily care. We focused on the elevation of plasma osmolarity accompanied with dehydration, and developed a skin blot examination to identify chronic dehydration using an osmolyte, taurine, as a biomarker. This is because taurine is taken into the cells as a protection for hyperosmotic shock, the taurine concentration reflects the osmolarity of interstitial fluid. We first conducted an animal experiment to reveal that the skin taurine can be extracted and measured quantitatively by skin blotting. Then, we developed the 1-minute staining procedure with a ninhydrin reaction. Finally, we showed that the skin blot examination for taurine had high accuracy (sensitivity: 77.3% and specificity: 81.8%) to identify the chronic dehydration of older adults (Higashimura, 2020). This innovation contributed to the extension of the healthy life expectancy, and realization of the healthy aging society.

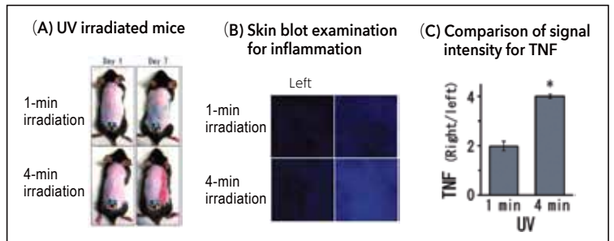


Figure 2. Identification of latent inflammation of mouse skin by skin blotting.

(A) The right dorsal skin of mice was irradiated by UV for 1 and 4 min. 4-min irradiation induced severe erosion on day 7, while no macroscopic findings were observed on day 1.
(B) The inflammation marker (TNF) was evaluated by skin blotting on day 1.
(C) Relative intensity of signal (right/left) was significantly higher in 4-min irradiation compared with 1-min irradiation
(modified from Minematsu et al. 2014).

Link to the Mission of GNRC

We conducted model studies of biological nursing with the collaboration of biologists and nursing scientists, and explored the methodology of biological nursing research in this department. We employed three postdoctoral fellows. These young researchers had original and flexible ideas. Through the process of implementing their ideas into concrete study plans and later performing them, the methodology of biological nursing was established. Furthermore, we globally conducted collaborative studies with internationally distinguished researchers such as Professor Keryln Carville of Curtin University, Australia,

Professor Dan Bader of University of Southampton, United Kingdom, and Professor Gregory Schultz of University of Florida, United States, and the scientists of the other field such as sports science.

Accumulated findings and experiences were systematized and spread to the researchers of nursing science and related fields through the lecture and hands-on seminar for Nursing Science and Engineering held by GNRC. Our attempts can be a fundamental part of the development of biological nursing.

Future Directions

Over the course of these four years, biological nursing studies were developed dynamically through networking overseas, working with other fields, and with the help of young researchers. We will put forth extra effort to further the expansion of these networks to help increase our presence in nursing science.

Although we have focused only on the physical symptoms of patients, the integration of mind and body can realize comprehensive nursing care. Therefore, we would like to try fusing with psychology, and propose a new field of nursing science (Bio-Psychological Nursing) which supports the mind-body integration and provides psychological and physical comfort to the patients.

Furthermore, the collaboration with sensor engineering, computer science, and communication engineering (Bio-engineering Nursing) are required to sublimate our technologies to user-friendly products. We would like to contribute to creating a society of health and longevity through the applications of our findings.

References

1. Minematsu T, Nakagami G, Yamamoto Y, Kanazawa T, Huang L, Koyanagi H, et al. Wound blotting: A convenient biochemical assessment tool for protein components in exudate of chronic wounds. Wound Repair Regen. 2013; 21: 329-34.
2. Minematsu T, Nakagami G, Mugita Y, Tamai N, Sanada H. Development of a distribution analysis method for metalloproteinase activity by combining wound blotting and zymography techniques: A pilot study in mice. J Nurs Sci Eng. 2018; 5(1): 58-64.
3. Kitamura A, Minematsu T, Nakagami G, Miyagaki T, Sasaki S, Hayashi C, et al. Assessing subclinical inflammation by peroxidase detection in patients with pressure ulcers. J Wound Care. 2019; 28(2), 586-91.
4. Astrada A, Nakagami G, Minematsu T, Goto T, Kitamura A, Mugita Y, et al. Concurrent validity of biofilm detection by wound blotting on chronic wounds. J Wound Care. Forthcoming 2020.
5. Nakagami G, Schultz G, Gibson DJ, Phillips P, Kitamura A, Minematsu T, Miyagaki T, Hayashi A, Sasaki S, Sugama J, et al. Biofilm detection by wound blotting can predict slough development in pressure ulcers: A prospective observational study. Wound Repair Regen. 2017; 25: 131-8.
6. Mori Y, Nakagami G, Kitamura A, Minematsu T, Kinoshita M, Suga H, et al. Effectiveness of biofilm-based wound care system on wound healing in chronic wound. Wound Repair Regen. 2019; 27(5): 540-7.
7. Minematsu T, Horii M, Oe M, Sugama J, Mugita Y, Huang L, et al. Skin blotting: A noninvasive technique for evaluating physiological skin status. AdvSkin Wound Care. 2014; 27(6) 272-9.
8. Higashimura S. Development of the measurement of taurine concentration by skin blotting: A non-invasive identifying method for chronic dehydration of vulnerable older people in home care setting. Doctral Thesis, The University of Tokyo. 2020.

Awards

1. Best Moderated Poster Award. 2019. The 8th Asia Pacific Enterostomal Therapy Nurse Association. Intra-rater reliability of albumin measurement by skin blottin in healthy volunteers. Minematsu T, Tsukatani T, Weijie K, Nakai A, Tomida S, Nakagami G, Sanada H.
2. Best Moderated Poster Award. 2019. The 8th Asia Pacific Enterostomal Therapy Nurse Association. Relationship between type IV collagen positivity via skin blotting and conventional risk factors of skin tears. Nakai A, Tsukatani T, Tamai N, Mori Y, Weijie K, Minematsu T, Takada C, Sanada H.
3. Best Oral Award. 2019. The 8th Asia Pacific Enterostomal Therapy Nurse Association. Biofilm-based wound care system for treating chronic wounds. Nakagami G, Sanada H, Mori Y, Minematsu T, Kitamura A.
4. Japan Institute of Design Promotion Good Design Award 2019. Elastic stocking Cool lala. Dai M, Batal Plus Corp, Yoshida Tsukasa Corp, Murayama H.
5. Best Innovation Poster Award. 2019, Skin Intergrity Summer School. ILF Japan. LIMPRINT reporting from ILF Japan. Sanada H, Sugama J, Dai M, Nakagami G.
6. 21th Japanese Society of Pressure Ulcer Conference Best Presentetion Award.. 2019. Relationship between seat pressure during competition and develoing pressure injuries in wheel chair basketball atheletes. Marda T, Tamai N, Minematsu T, Noguchi H, Nakagami G, Yabunaka K, Sanada H.
7. 28th Japanese Society of Wound, Ostomy and Continence Management Conference. 2019. Investigation of deep tissue injuries in basketball athletes: skin properties related to deep tissue injuries.Minematsu T, Ogata M, Tamai N, Yabunaka K, Maeda T, Nakagami G, Noguchi H, Sanada H.
   Institute Journal of Japanese Society of Wound, Ostomy and Continence Management Academic Paper Excellence Award 2017.
8. Situation of occurrence and morphological characteristics of pressure ulcers among inpatients with mental illness. Nozawa K, Tamai N, Minematsu T, Kitamura A, Saegusa M, Amaike K, Sanada H. Journal of Japanese Society of Wound, Ostomy and Continence Management Volume 21 No. 1 : 10-24. The Best Presentation Award. 2018. 21st East Asian Forum of Nursing Scholars & 11th International Nursing Conferences. Skin blotting as a measure of albumin and nerve growth factor β can predict presence pruritus among elderly population. Sari WD, Minematsu T, Yoshida M, Sanada H.
9. Institute Journal of Japanese Society of Wound, Ostomy and Continence Management Academic Paper Excellence Award 2017
   Development and assessment of air mattress with independent air cell pressure control responsive to interface pressure distribution (Development and assessment of air mattress with independent air cell pressure control responsive to interface pressure distribution). . Hori N, Tamai N, Noguchi H, Nakagami G, Sugama J, Mori T, Sanada H. Journal of Japanese Society of Wound, Ostomy and Continence Management Volume 20 No. 3 : 300-9.

Competitive Research Fundings

1. 2020 Yamaji Fumiko Cultural Fundation. Fumiko Yamashi foundation for Nursing Education and Reseaerch. Development of comprehensive evaluation of local and systemic condition by skinblotting. PI: Ayano Nakai, CI: Takeo Minematsu
2. 2020 JSPS KAKENHI Grant-in-Aid for Scientific Research 2020 Basic research(B) Grant Number 20H04010.Optimization of pressure injury bacterial flora by adjusting wound environment: Deveolpment of wound biofilm control method. PI; Gojiro Nakagami, CI: Takeo Minematsu
3. 2020 JSPS KAKENHI Grant-in-Aid for Scientific Research 2020 Basic research(B) Grant Number 20H03995.Elucidation of the mechanism of skin trounles in newborns using skin blottin. PI: Kaori Yonezawa, CI: Takeo Minematsu
4. 2020 JSPS KAKENHI Grant-in-Aid for Scientific Research 2020 Basic research(A) Grant Number 20H00560, Development of non-invasive liquid assessment technology to realize smart home care concept. PI: Hiromi Sanada, CI: Takeo Minematsu.
5. 2019 KOSE Cosmetology research foundation. Costmetology Research Grant 2019. Development of prediction model of skin tear in older patients. PI: Misako Dai
6. 2019 Japanese Society of Pressure Ulcers. Japanese Society of Pressure Ulcers Research Grant 2019. Polymorphism analysis of candidate risk genes for pressure ulcers in older Japanses partints: A crpss-sectional study at a long-term care hospital. PI: Takeo Minematsu.
7. 2019 Japanese Society of Pressure Ulcers. Japanese society of pressure ulcers research grant 2019.Development and evaluation for pressure measurment method to prevent pressure ulcers: To forward performance level in Tokyo Palalympics 2020. PI: Misako Dai.
8. 2019 JSPS KAKENHI Grant-in-Aid for Scientific Research 2019 for Young Scientists (Start-up) Grant Number 19K24194. Incontinence-associated dermatitis by infected urine: biological mechanisms and prevention strategies. PI: Sofoklis Koudounas.
9. 2019 JSPS KAKENHI Grant-in-Aid for Scientific Research 2019 Basic research(C) Grant Number 19K11508. Developmpenet of non-invasive evaluation method of athletes' condition. PI: Mitsuo Neya, CI: Takeo Minematsu.
10. 2019 JSPS KAKENHI Grant-in-Aid for Scientific Research 2019 Basic research(C) Grant Number 19K10947.Risk factors for itching of hair loss scalp in patients with chemotherapy treatment and development of scalp care for them.PI: Nao Tamai, CI: Takeo Minematsu.
11. 2019 JSPS KANKENHI Grant-in-Aid for Scientific Research 2019 Basic research(C) Grant Number 19K10764. Development of detection of inflammatory cytokine levels in anal Mucosa by noninvasive specimen collectionPI: Makoto Tanaka, CI: Takeo Minematsu.
12. 2019 JSPS KAKENHI Grant-in-Aid for Scientific Research 2019 Basic research(B) Grant Number 19H03931. Development of wearable wig that can predict worsening head skin condition among patients with hairloss by cancer treatment., PI: Mieko Uchiyama, CI: Nao Tamai, Takeo Minematsu.
13. 2019 JSPS KAKENHI Grant-in-Aid for Scientific Research 2019 for Challenging Exploratory Research Grant Number19K22744. Development of skin dressing for pressure ulcer prevention to show the tissue damage. PI: Takeo Minematsu.
14. 2018 The Sasakawa Scientific Research Grant 2018, . Investigation of pressure ulcers among wheel chair basketball athletes: Toward increasing performance level in Tokyo palalympic 2020. PI: Tomonori Maeda, CI: Nao Tamai, Takeo Minematsu.
15. 2018 Grant business Yamaha Motor Foundation for sports challenge 2018. Relationship between seat pressure during competition and skin damage among wheelchair basketball athletes. PI: Nao Tamai.
16. 2018 The University of Tokyo, GAP fund research grant program, Implementation of practical application of non-invasive skin assessment method applying skin blotting technology. PI: Takeo Minematsu.
17. 2018 JSPS KAKENHI Grant-in-Aid for Scientific Research 2018 for Young Scientists Grant Number 18K1745, Care innovation for the evaluation of remodeling to prevent recurrent pressure ulcers. PI: Tamae Urai.
18. 2018 JSPS KAKENHI Grant-in-Aid for Scientific Research 2018 Basic research (C) Grant Number 18K10142, . Exploration of biomarkers for pressure ulcer prediction and its clinical application. Kazuhiro Ogai, Takeo Minematsu.
19. 2018 JSPS KAKENHI Grant-in-Aid for Scientific Research 2018 Basic research (C) Grant Number18K10268, Development of screening system for tinea pedis in foot. PI: Kimie Takehara, CI: Takeo Minematsu.
20. 2018 JSPS KAKENHI Grant-in-Aid for Scientific Research 2018 for Challenging Exploratory Research Grant Number18K19669. Does the bacterial flora in the bed environment cause pressure ulcer infections? A new paradigm of infection development mechanisms.PI: Gojiro Nakagami.
21. 2018 JSPS KAKENHI Grant-in-Aid for Scientific Research 2018 Basic research(B) Grant Number18H03068, Development of the examination of genetic polymorphisms to identify high risk patients for pressure ulcer occurrence. PI: Takeo Minematsu.

Division of **Care Innovation**

Department of **Visualized Nursing**

Supported by Fujifilm Corporation

Project Associate Professor, Koichi Yabunaka *PhD* April 2017–March 2019
Current: Ultrasound Center, Ohno Memorial Hospital, Director

Nao Tamai *PhD, RN* April 2019–Present

Project Senior Assistant Professor, Mikako Yoshida *PhD, RN* April 2017–March 2019
Current: Department of Women's Health Nursing & Midwifery, Graduate School of Medicine Tohoku University, Associate Professor

Project Senior Assistant Professor, Masaru Matsumoto *PhD, RN* April 2017–March 2019

Project Assistant Professor, Masaru Matsumoto *PhD, RN* April 2019–Present

Yuka Miura *PhD, RN* April 2019–Present

Misako Nagata *PhD, RN, NP, APHN-BC, CCRN* Dec. 2020–Present

Part-time Lecturer, Atsuo Kawamoto *PhD* April 2019–Present

Collaborative Researcher, Mayumi Handa April 2017–Present

Takuya Tsutaoka April 2017–May 2018

Mikihiko Karube June 2018–Present

Collaborative Department

Professor, Hiromi Sanada *PhD, RN, WOCN, FAAN* April 2017–Present

Associate Professor, Gojiro Nakagami *PhD, RN* April 2017–Present

Aims and Achievements

Today, Japan is facing many challenges due to its super-aged society. Under such circumstances, telemedicine and nursing technology through the introduction of new technology will be essential for future home healthcare. Physical assessment performed by nurses in the absence of a physician, such as at home, is difficult to standardize because it relies on inspection, palpation, and auscultation, in which the success or failure depends on the skills of the individual nurse. Therefore, there is an urgent need to establish assessment techniques based on visualization using imaging technology, which is the sixth type of physical assessment technique, and to verify the effects of care.

In the field of Visualized Nursing, we have been practicing translational research through the standardization of nursing assessment techniques using imaging technology, the development and evaluation of educational programs, and applying them to clinical practice. The overall aim of these expenditures is "establishing innovative nursing care using visualization technology to support optimal health in daily life". Our goal was to standardize nursing assessment techniques using ultrasonography and to promote research in imaging nursing science that directly relates to clinical practice. Furthermore, we have been working to establish the field of visualized nursing that is directly related to clinical practice by training nurse scientists who can practice these techniques and by building a model for imaging nursing research. The members' main research themes focus on the basics of life, such as elimination, eating, and sleep, and in collaboration with radiologists and engineering researchers, they are working to standardize observation techniques using ultrasound devices and to verify their effectiveness in clinical settings. These results were published in 41 English papers and 7 Japanese papers in academic journals. They were also reported in 19 international conferences and 54 domestic conferences, some of which were highly evaluated (2 awards in domestic conferences). Moreover, the result of the collaboration between Imaging Nursing Science and Fujifilm Corporation was a wireless portable ultrasound system announced in 2019 [1,2]. The ultrasound system is a compact and lightweight wireless device with high image quality and portability, and incorporates a guide function for probe application and an AI-assisted automatic measurement function for urine volume in the bladder (Figure 1). In anticipation of the era when nurses will use ultrasound devices like stethoscopes in clinical settings, we have achieved early development of the device through joint industry-academia research.

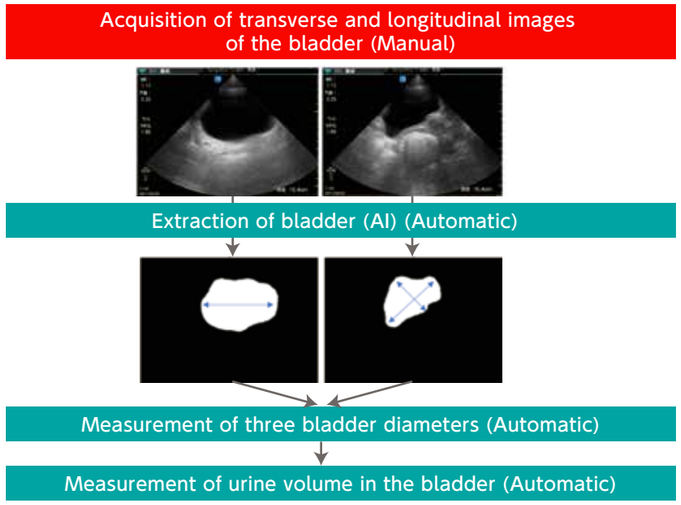


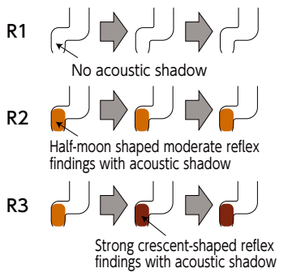
Figure 1. Outline of AI-assisted automatic measurement of urine volume in the bladder
Based on the transverse and longitudinal images acquired by the user, the bladder is extracted based on machine learning, and the left-right, front-back, and top-bottom diameters of the bladder are measured to automatically measure the urine volume. (Modified from Matsumoto et al. 2019)

Contribution to Care Innovation

The research theme of the field of Visualized Nursing is the development and evaluation of educational materials and techniques that enable nurses to easily and accurately assess symptoms and select appropriate care using ultrasonography. Ultrasound devices are non-invasive, simple, and real-time device, and in recent years it has been attracting attention as a tool that nurses can use for assessment in the clinical setting because of its high image quality, small size, light weight, and multi-purpose use. However, specialized

knowledge and skills are required to take and read ultrasound images. We have developed educational programs such as e-learning, technical seminar, and ICT-based image consultation that can effectively and quickly (in as little as one week) teach the skills of ultrasound imaging and reading. In addition, to support ultrasound reading skills, we have developed a hand-held ultrasound device (iViz air) equipped with AI-based image reading assistance functions, which has contributed to the realization of accurate assessment and care in a short time for nurses to perform point-of-care.

One example of the research we have been conducting is the assessment of colonic fecal retention using ultrasonography. It is difficult to assess fecal retention and provide defecation care for patients who have difficulty in reporting their own symptoms, especially at home. In this study, we investigated the relationship between constipation symptoms and fecal distribution changes by observing fecal distribution changes in the colorectum ultrasonography in elderly patients with constipation symptoms. As a result, hyperechoic findings with acoustic shadows appeared and persisted in the rectum in 74.4% of all subjects (Fig. 2) [3]. Furthermore, the appearance and persistence of strong crescent-shaped reflex findings using ultrasonography was strongly associated with constipation symptoms. In other words, the assessment of fecal retention in the rectum is important for elderly patients with constipation symptoms, and the assessment can be done based on the ultrasonographic findings in the rectum. However, in the past, it took about three months of training for a home health care nurse to be able to observe the large intestine and assess the presence and type of constipation using an ultrasound device by herself when she visited the patient's home. This training includes one full day of face-to-face lectures, one month of one-on-one practical instruction, and two months of training in image evaluation. Therefore, we standardized the ultrasonographic observation techniques and created an e-learning program that allows nurses in the field with limited learning time to learn the techniques anytime, anywhere on a PC or tablet. This e-learning course consists of 2.5 hours of material consisting of basic knowledge of defecation care, basic knowledge of ultrasonography, and knowledge necessary for observation of the colon using ultrasound devices. In addition, the lecture includes a 3.5-hour technical seminar that provides step-by-step training in the basics of ultrasonography and actual scanning and observation methods, a 1.5-hour practical skills evaluation in the form of an objective clinical competency test, a one-week self-study period with the provision of ultrasound devices and a review of the materials, a follow-up session during the self-study period between participants and instructors using SNS, and lastly, image consultation using ICT technology. In a technical evaluation of ultrasonographic observation of the large intestine conducted on 39 participants of the educational program, all of them scored the



		n	Less than one bowel movement per three days	p value	Hard stool	p value
			n (%)		n (%)	
Echo pattern	R1	21	8 (38.1)	0.00	3 (14.3)	0.00
	R2	22	9 (40.9)		3 (13.6)	
	R3	14	13 (92.9)		13 (92.9)	

Figure 2. Relationship between rectal pattern identified by ultrasonography and constipation symptoms

(R1) No finding with acoustic shadow (R2) Moderate reflex finding of half-moon shape appears and (R3) Continues Appearance and persistence of strong crescent-shaped reflex findings Hyperechoic findings with acoustic shadow appeared and continued in 74.4% of the subjects.Rectal pattern R3 was found to be associated with constipation symptoms (Modified from Tanaka et al. 2018)

best or second best value out of 6 ratings, indicating that the necessary skills can be acquired in a short time through the educational program [4].

The effectiveness of defecation care based on observation of the colon using ultrasound devices by home care nurses who received these educational programs was tested on patients with suspected constipation under home care using a single-case experimental design. In the intervention phase, care during constipation and care to prevent constipation were implemented according to an algorithm for selecting defecation care using ultrasonography. Specifically, when fecal retention in the rectum was confirmed by ultrasonography rectal constipation (voiding dysfunction) was suspected and the presence of hard stool was confirmed by rectal ultrasonographic findings. If there was no hard stool, care was first given to promote spontaneous evacuation of stool. If there was hard stool and the patient could not evacuate stool by himself, manual defecation care such as suppositories, enemas, and digital disimpaction was given. If rectal retention of stool was not confirmed, care to stimulate intestinal peristalsis was performed and the next defecation was confirmed. As a result, the number of hard stools and manual defecation and the number of stimulant laxatives and glycerin enemas decreased significantly in the intervention period compared with the control period [5]. In other words, it is thought that the type of constipation was correctly assessed by ultrasonographic observation, which led to the selection of more appropriate defecation care and improvement of constipation symptoms. The development of ultrasonographic techniques has allowed us to achieve our goal from the beginning: "Establishment of innovative nursing care using visualization technology to support optimal health in daily life".

For reading ultrasonographic images of fecal retention in the rectum, we have developed a reading support tool that automatically recognizes the presence or absence of a fecal mass in the rectum and whether or not it is a hard fecal mass using AI technology based on convolutional neural networks (Fig. 3). This reading aid tool has been shown to have a sensitivity of 100% and specificity of 100% for the presence of fecal masses in 42 patients, a sensitivity of 85.7% for hard fecal masses, and a sensitivity of 88.2% for non-hard fecal masses [6]. Therefore, it can be said that AI technology-based reading support tools can significantly shorten the time required to gain experience in image evaluation, which was previously required. These educational materials based on standardized techniques, reading support tools, and effectiveness verification using algorithms for selecting care using ultrasound devices have been systematized as a series of packages and applied to the fields

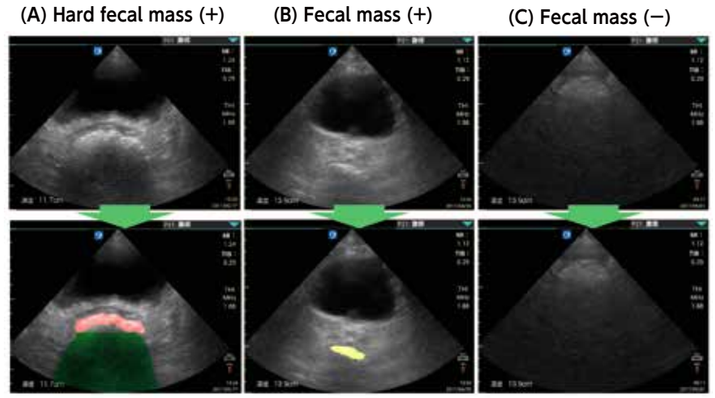


Figure. 3 Automatic recognition of fecal retention and fecal mass properties in the rectum by AI

(A) Hard fecal mass in the rectum was automatically colored red, and posterior acoustic shadow was automatically colored green.
(B) Fecal mass (not hard fecal mass) in the rectum was automatically colored yellow.
(C) No coloration without fecal mass in the rectum (Modified from Matsumoto et al. 2020)

of urination care [1,2,7], pressure injury care [8], and eating and swallowing care [9,10]. This systematized package enables even working nurses to acquire and evaluate ultrasound images appropriately in a short period of time, and enables care innovation based on physical assessment that visualizes the inside of the body using ultrasound devices in clinical settings.

Link to the Mission of GNRC

In this field, we aim to establish the field of Visualized Nursing as a discipline directly related to clinical practice. To achieve this goal, we have developed new nursing techniques that enable accurate symptom assessment by visualizing the inside of the body through collaborative research among nursing researchers, sonographers, and engineering researchers. The educational programs systematized in this field have been disseminated to researchers and practitioners in nursing and peripheral fields through introductory seminars and Hands-on Seminars in Nursing Science and Engineering organized by GNRC. Furthermore, we have been disseminating the program to nurses working in clinical settings through the Echo Program from the Reseach Institute for Next-Generation Nursing Education, which was established in June 2019. This corporation is a research and educational institution established to train the next generation of human resources who can apply the results of cutting-edge research to the field in a speedy and effective manner. To date, more than 50 nurses nationwide have been certified as instructors through an educational program developed by the Visualized Nursing field. The dissemination of new ultrasound-based nursing techniques has not been limited to Japan; through summer programs and collaborative research, we have also provided techniques to Nottingham University in the UK, Kitamura clinic in Indonesia, and Tanjungpura University Hospital. These efforts have contributed to the construction of a model for visualized nursing research, in which visualization technology research for symptom assessment is returned to and evaluated in clinical care, and will serve as a foundation for future development.

Future Directions

For the past four years, the Visualized Nursing Research Project at the GNRC has been working to standardize ultrasound-based nursing techniques, develop educational programs, disseminate the techniques in clinical practice, and evaluate their effectiveness so that more nurses can use them. In order to further promote care based on state-of-the-art imaging technology in clinical practice, it is necessary to establish a more efficient system for disseminating the technology. Up to now, participation in face-to-face technical workshops has been required to acquire observation skills, but in the future, we would like to establish a remote learning system that makes full use of VR/AR technology and consultation systems to further expand the scope and target of technology provision to the world. In addition, we would like to work on the development of new technologies in collaboration with molecular biology and sensor engineering as visualization technologies that can be applied by nurses for real-time symptom assessment at the bedside. The next step is to build a system to promote the social implementation of these cutting-edge technologies and to conduct empirical research.

The future of Visualized Nursing is to propose remote monitoring using the most advanced visualization technology, to educate medical professionals patients and their families in the acquisition of visualization technology, to build a system for information sharing, and spread AI-assisted assessment and care to the world in order to support the lives of people undergoing treatment.

References

1. Matsumoto M, Tsutaoka T, Yabunaka K, Handa M, Yoshida M, Nakagami G, et al. Development and evaluation of automated ultrasonographic detection of bladder diameter for estimation of bladder urine volume. PLOS ONE. 2019;14(9):e0219916.
2. Tamai N, Miura Y, Matsumoto M, Takada C, Sanada H. Reliability of bladder images after completion of an ultrasound-based urinary management education program: a report of one nurse's achievement. J Jpn Soc Geriatr Urol. 2019;32(2):46-51. (in Japanese)
3. Tanaka S, Yabunaka K, Matsumoto M, Tamai N, Noguchi H, Yoshida M, et al. Fecal distribution changes using colorectal ultrasonography in older people with physical and cognitive impairment at long-term care facilities: A longitudinal observational study. Healthcare. 2018;6(2):55.
4. Matsumoto M, Yoshida M, Miura Y, Sato N, Okawa Y, Yamada M, et al. Feasibility of the constipation point-of-care ultrasound educational program in observing fecal retention in the colorectum: a descriptive study. Jpn J Nurs Sci. 2020;18(1):e12385.
5. Matsumoto M, Yoshida M, Yabunaka K, Nakagami G, Miura Y, Fujimaki S, et al, Safety and efficacy of a defecation care algorithm based on ultrasonographic bowel observation in Japanese home-care settings: a single-case, multiple-baseline study. Geriatr Gerontol Int. 2020;20(3):187-94.
6. Matsumoto M, Tsutaoka T, Nakagami G, Tanaka S, Yoshida M, Miura Y, et al. Deep learning-based classification of rectal fecal retention and property using ultrasound images in older adult patients. Jpn J Nurs Sci. 2020;17(4):e12340.
7. Matsumoto M, Yabunaka K, Yoshida M, Nakagami G, Sanada H. Validity assessment of two bladder volume estimation methods using hand-held ultrasonography devices: verification with a small amount of bladder urine. J Nurs Sci Engineer. 2019;6(1):22-32.
8. Matsumoto M, Nakagami G, Kitamura A, Kurita M, Suga H, Miyake T, et al. Ultrasound assessment of deep tissue on the wound bed and periwound skin: A classification system using ultrasound images. J Tissue Viability. 2021;30(1):28-35.
9. Miura Y, Yabunaka K, Karube M, Tsutaoka T, Yoshida M, Matsumoto M, et al. Establishing a Methodology for Ultrasound Evaluation of Pharyngeal Residue in the Pyriform Sinus and Epiglottic Vallecula. Respir Care. 2020;65(3):304-13.
10. Miura Y, Nakagami G, Yabunaka K, Tohara H, Noguchi H, Mori T, et al. A Randomized Controlled Trial to Investigate the Effectiveness of the Prevention of Aspiration Pneumonia Using Recommendations for Swallowing Care Guided by Ultrasound Examination. Healthcare. 2018;6(1):e15.

Awards

1. Best Presentation Award at the 21st Annual Meeting of the Japanese Society for Pressure Ulcer. 2019. Relationship between pressure on the buttocks and pressure ulcer in wheelchair basketball athletes. T. Maeda, N. Tamai, T. Minematsu, H. Noguchi, G. Nakagami, K. Yabunaka, H. Sanada.
2. Society Award at the 7th Annual Meeting of Nursing Science and Engineering. 2019. Validity assessment of two bladder volume estimation methods using hand-held ultrasonography devices: verification with a small amount of bladder urine. Nursing Science and Engineering Matsumoto M, Yabunaka K, Yoshida M, Nakagami G, Sanada H. Jounal of Nursing Science and Engineering. 2019;6(1):22-32.

Competitive Research Fundings

1. 2020 JSPS KAKENHI Grant-in-Aid for Scientific Research (A). Grant Number 20H00560. Development of Non-invasive Liquid Assessment Technology for Realization of Smart Home Care Concept. PI: Hiromi Sanada, CI: Nao Tamai.
2. 2020 JSPS KAKENHI Grant-in-Aid for Scientific Research for Young Scientists. Grant Number 20K19237. Development of a protocol to promote oral intake after gastroduodenoscopy using bioengineering analysis. PI: Yuka Miura.
3. 2020 The Sasakawa Scientific Research Grant. Development of a method for early detection of urinary tract infection in bedridden elderly patients using ultrasound imaging system. PI: Emiko Nakayama, CI: Nao Tamai, Masaru Matsumoto.
4. 2020 Japanese Sociaty of Wound, Ostomy and Continence Management AlCARE Technology and Research Grant. Relationship between morphological changes in urinary tract and urinary tract infection using echography in bedridden elderly patients. PI: Emiko Nakayama, CIs: Nao Tamai, Masaru Matsumoto.
5. 2019 JSPS KAKENHI Grant-in-Aid for Scientific Research (C). Grant Number 19K10947. Exploration of risk factors for itchy scalp for hair loss in patients undergoing chemotherapy and establishment of scalp care. PI: Nao Tamai.
6. 2019 Terumo Life Science Foundation. Research and Development Grant. Standardization of Constipation Care Based on Echo Observation: Verification of Reliability and Validity. PI: Masaru Matsumoto.
7. 2018 JSPS KAKENHI Grant-in-Aid for Scientific Research for Young Scientists. Grant Number 18K17427. Development of an assessment method using point-of-care ultrasound for pressure ulcers whose depth is difficult to determine. PI: Masaru Matsumoto.

Division of **Care Innovation**

Department of Clinical Nursing Technology

Supported by Terumo Corporation

Project Associate Professor, Ryoko Murayama *PhD, RN, RNM* April 2017–Present

Project Assistant Professor, Mari Abe *MHS, RN* April 2017–Present

Visiting researcher, Hidenori Tanabe *MS* April 2017–Present

Collaborative Department

Professor, Hiromi Sanada *PhD, RN, WOCN, FAAN* April 2017–Present

Aims and Achievements

Our goal is to find clues that will help us in solving clinical problems. We do this by getting involved in interdisciplinary research with specialists from different fields and various occupations and by observing problems that arise in clinical practice. Additionally, as a resolution to these problems, we are developing new nursing skills and products by engaging in collaborative research with medical device companies. We aim to revolutionize 'nursing translational research' which includes human resource development in clinical settings. Our aim is to incorporate the ingenuity of our products into nursing to the best of our ability.

This department is in charge of the Social Cooperation Program, Advanced Nursing Technology and Department of Gerontological Nursing/Wound Care Management. We made the best use of our laboratory location, the University Hospital, in order to understand the true needs that need to be solved in the clinical setting. We can observe real situations and collect data 24 hours a day. Since our department collaboratively works with clinical and departments at hospital, it is possible to smoothly obtain research cooperation with nurses, medical doctors, and other medical staff.

We will now focus on the development of nursing skills for infusion therapy using a peripheral intravenous catheter. We learned about issues occurring in clinical practices, then conducted surveys based on our findings. We then conducted research using a molecular biology approach, accumulated evidence, and discovered a new device idea based on those findings. In order to implement new nursing skills that use these devices in a clinical setting, we are conducting evaluation research. We were able to quickly progress in our research and reach the final stages.

Achievement of above-mentioned research activities were reported to world wide (Publishments: English paper 22; Japanese paper 5, Conference presentation: overseas 12; domestic 20) some of them were awarded a prize (Article awards 2, Conference presentation award 1)

Contribution to Care Innovation

First, we focused on premature catheter removal before infusion therapy completion. The symptoms that result from premature removal of the catheter such as swelling, redness, and pain, are called catheter failure (CF). This problem is dealt with in our main research topic "Development of Nursing Skills for Infusion Therapy Using a Peripheral Intravenous Catheter" as a higher priority challenge. According to our research, we showed that CF incidence rates were between 18.8-30.0% in a university hospital [1,2]. If CF occurs, patients require catheter reinsertion to continue infusion therapy. This means that the patients who have CF are exposed suffering the symptoms with CF and puncture pain for reinsertion. This process also stresses out the nurse because they have to inflict pain on the patients again[3]. It also leads to an increased work load for the nurses and a heavy cost. Thus, our research aims to mitigate the development of CF entirely.

We focused on ultrasonography visualization techniques in order to elucidate of CF pathophysiology which is required for its prevention. We tried to capture the conditions of subcutaneous tissue and vessels when the catheter was removed, and conducted analysis of ultrasonographic images with an ultrasonographer. As a result, we discovered that thrombi with subcutaneous edema were significantly more prevalent at catheterization site in the cases with CF compared to the normal cases[2]. Four requirements for CF prevention were created for the risk factor analysis; (i) select the vessel with a large diameter (3.3 times the external diameter of catheter), (ii) successfully insert on the first attempt, (iii) secure the catheter tip in a non-stimulatory position on the vessel wall by visualization technique, (iv) use a catheter made of soft materials (polyurethane is softer than polytetrafluoroethylene) [2,4,5,6]. We conducted an intervention study using the care bundle for reducing mechanical stimuli which incorporated (i), (iii) and (iv). The results showed that incidence of CF was 29.2% in the control group and 11.1% in the intervention group[7]. (Figure 1) We developed an educational program for clinical nurses using an algorithm which integrates the previously mentioned procedures. From the research we did on our educational program provided to nurses, the CF incidence rate reduced to a mere 8.7 %[8].

In order to reach our final goal of prohibiting CF entirely, we must make an innovation that meets requirement (ii), success of insertion on the first attempt. According to our survey, the first attempt success rate using a conventional catheterization method by palpation and macroscopic inspection was 52.8- 67.0% [6,7]. In other words, over 30% of patients who require a peripheral intravenous catheter were forced to have multiple punctures. It is reported that the nurse, the person that actually does the insertion, also feels stress by inflicting pain on the patient[3]. Success in doing the peripheral intravenous catheterization is a big clinical issue for nurses not only patients, furthermore, it is a nursing skill to develop

also feels stress by inflicting pain on the patient. Success in doing the peripheral intravenous catheterization is a big clinical issue for nurses not only patients, furthermore, it is a nursing skill to develop techniques for CF prevention. We think ultrasonography is useful in increasing first time success rate. Many studies have reported that ultrasonography increases the success of catheterization when the patient has difficult vascular access. We used ultrasonography to target veins including visible and palpable veins, regardless of vascular characteristics. As a consequence, we achieved an 85.3% success rate on the first attempt of catheterization as to the 60-70% by conventional method. Additionally, CF incidence was only 3.2% in this study [9].

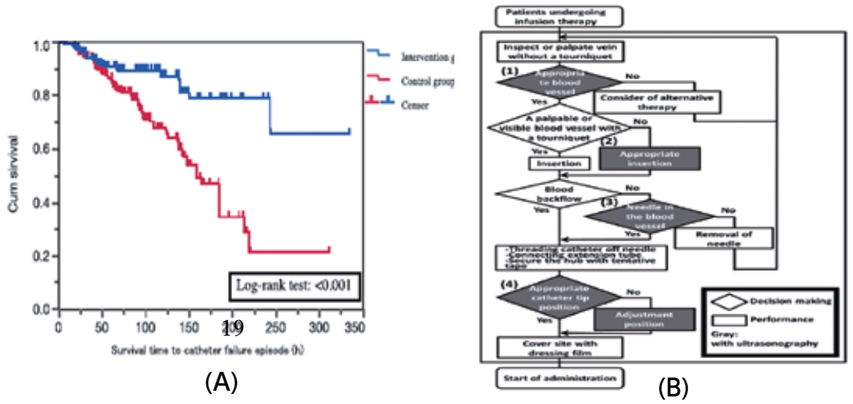


Figure 1 The result of interventional study and the algorithm

(A) Survival curve of CF incidence in the cases with using care bandle we developed (blue line) and without care bandle (red line). (B) The algorithm for using the care bandle in clinical practice. (From Takahashi et al.,2020[7]; Kanno et al.,2020[8])

What should be highlighted was the development of the skill of using ultrasonography for peripheral intravenous catheterization. Our research contributes to care Innovation by providing comfort to patients and reducing suffering which is the overall base of nursing.

Prevention of a severe complication during infusion therapy is important. We have implemented techniques to detect anticancer-drug extravasation early on. Extravasation incidence is reported less than 0.1%; however, if it occurs, the patients require surgical treatment for ulceration, necrosis in severe cases, or remain permanently damage due to nerve or muscle injury. Currently, extravasation is only detected by patients' complaints, nurse' s macroscopic inspection at catheterization sites, and by poor infusate dripping. In these situations, infusions might have already leaked outside the vein to some extent. This means that it is difficult to detect a small amount of leakage early on.

We have focused on changing the skin surface temperature as a strategy to solve these leakage problems. Since anticancer-drugs are generally administered with lower temperatures than the skin temperature, we hypothesized that if extravasation occurs, the skin temperature around the catheterization site might be cooler. To test this, we continuously observed the skin temperature around the catheterization site among various patients who were receiving chemotherapy at an outpatient chemotherapy room using a thermography. As a result, the cases with a specific temperature pattern (a fan-shaped) had a significantly higher incidence of induration on the next treatment day (71.4%) than other skin temperature patterns[10]. This result suggested the possibility of using skin temperature

observation as a method to catch the change of subcutaneous tissue status when administering anticancer-drugs. We then developed a thermo sensitive liquid crystal film (International patent number: WO2015/045371) to continuously monitor skin temperature with engineering researchers, and evaluated it in a clinical setting[11]. (Figure 2)

This product worked so that when a specific temperature distribution pattern was shown, the subcutaneous edema image was confirmed by ultrasonography around the catheter tip position immediately after the completion of the anticancer-drug administration.

This product is considered to be a fluid that indicates interstitial fluid retention due to an inflammatory reaction or drug leakage.

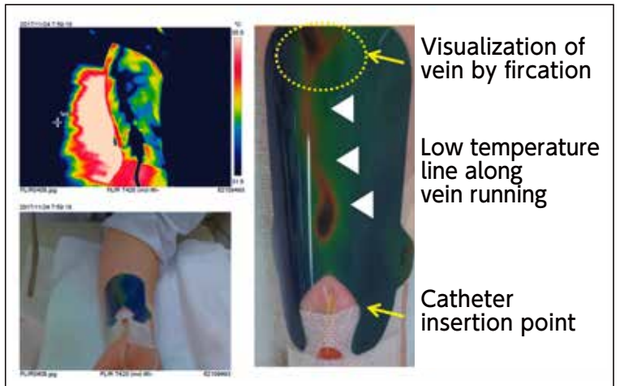


Figure 2 Temperature distribution image of the peripheral intravenous catheterization site

Thermography (upper left), Thermosensitive liquid crystal film (Right), The image using the filim during infusion therapy (lower left).

When testing the product, no obvious subjective symptoms and no abnormalities were found by macroscopic inspection or palpation, and the patients completed the planned administration of anticancer-drugs[12]. This result showed that the film was able to detect a tiny amount of drug leakage which was previously undetectable from patients' complaints or macroscopic observation.

Until now, nurses have assessed the patient's condition using observation techniques such as macroscopic inspection and palpation. Based on this, by using technologies such as ultrasonography and thermography, it has become possible to know the patient's condition in more detail and objectively. In the current society, the number of patients who have difficulty complaining about their own pain and/or discomfort is increasing. We strongly believe it is essential for the future development of nursing technology to provide care while obtaining objective and detailed information by making full use of technology.

Contribution to the fulfillment of the missions of GNRC

Nursing researchers conducted some of the collaborative research with different field researchers making the solution method clear. The research results were presented at overseas academic conferences, all while having the opportunity to discuss with researchers from other countries every year. We worked on the development of nursing technology that could be returned to Japanese clinical practice while also discovering techniques used around the world.

Furthermore, the cycle of nursing translational research worked due to device development by joint research with medical device manufacturing companies, evaluation of the products clinically, and through the utilization of medical devices such as ultrasonography and thermography to support or improve nursing technologies. We believe that those research activities are directly linked to the mission of the Global Nursing Research Center to establish the field of innovative nursing through an interdisciplinary fashion.

Future Directions

We, Clinical Nursing Technology, are proud of the model of development for nursing translational research which pinpoints the needs in clinical practice, thoroughly investigates the pathological condition by interdisciplinary efforts with researchers from different fields and various occupations, and finds the best solution to problems. If there is no existing product, we develop a novel product with a view of developing human resources that can make the best use of it. Therefore, we believe that by disseminating the nursing technology produced by this system, implementing it in clinical practice, and establishing it, it will show actual achievement as a model to lead the future interdisciplinary fashion.

References

1. Murayama R, Uchida M, Oe M, Takahashi T, Oya M, Komiyama C, et al. Removal of peripheral intravenous catheters due to catheter failures among adult patients. J Infus Nurs. 2017;40(4):224-31.
2. Takahashi T, Murayama R, Oe M, Nakagami G, Tanabe H, Yabunaka K, et al. Is thrombus with subcutaneous edema detected by ultrasonography related to short peripheral catheter failure? J Infus Nurs. 2017;40(5):313-22.
3. Inoue A, Hosaka Y, Murayama R, Tanabe H, Oe M, Uchida M, et al. Subjective experiences at the time of peripheral vein needle insertion and route connection in fluid therapy. J Nurs Sci Eng. 2017;4(1):67-72. (Japanese)
4. Tanabe H, Takahashi T, Murayama R, Yabunaka K, Oe M, Matsui Y, et al. Using Ultrasonography for Vessel Diameter Assessment to Prevent Infiltration. J Infus Nurs. 2016;39(2):105-11.
5. Tanabe H, Murayama R, Yabunaka K, Oe M, Takahashi T, Komiyama C, et al. Low-angled peripheral intravenous catheter tip placement decreases phlebitis. J Vasc Access. 2016;17(6):542-7.
6. Murayama R, Takahashi T, Tanabe H, Yabunaka K, Oe M, Oya M, et al. The relationship between the tip position of an indwelling venous catheter and the subcutaneous edema. BioScience Trends. 2015;9(6):414-9.
7. Takahashi T, Murayama R, Abe-Doi M, Miyahara-Kaneko M, Kanno C, Nakamura M, et al. Preventing peripheral intravenous catheter failure by reducing mechanical irritation. Scientific Reports. 2020;31:10(1):1550. doi:10.1038/s41598-019-56873-2
8. Kanno C, Murayama R, Abe-Doi M, Takahashi T, Shintani Y, Nogami J, et al. Development of an algorithm using ultrasonography-assisted peripheral intravenous catheter placement for reducing catheter failure. Drug Discov Ther. 2020;14(1):27-34. doi:10.5582/ddt. 2019.01094
9. Abe M, Murayama R, Komiyama C, Sanada H, P11-02 Effectiveness of an algorithm using ultrasonography-assisted peripheral intravenous catheter placement for reducing catheter failure and increasing first attempt: Practical report. Poster presented at the 8th Annual conference of the society for Nursing Science and Engineering (abstract p19) ; 2020 Oct 24th-25th ; Osaka Japan.
10. Oya M, Murayama R, Oe M, Yabunaka K, Tanabe H, Takahashi T, et al. Continuous thermographic observation may predict extravasation in chemotherapy-treated patients. Eur J Oncol Nurs. 2017;28:56-61.
11. Abe-Doi M, Murayama R, Tanabe H, Kamiyama E, Komiyama C, Matsui Y, et al. Usability, feasibility, and safety test of a new thermosensitive liquid crystal film for the early detection of extravasation in clinical practice: A pilot study. J Nurs Sci Eng. 2020;7:89-98. DOI:10.24462/jnse.7.0_89
12. Abe-Doi M, Murayama R, Tanabe H, Komiyama C, Sanada H, Evaluation of a thermosensitive liquid crystal film for catheterization site assessment immediately following chemotherapy administration: an observational study. Eur J Oncol Nurs. 2020;48:101802.

Awards

1. Best Chairperson Award. 2017. The 26 th Japanese Society of Wound, Ostomy & Continence Management. Characteristics of subcutaneous tissues at the site of insertion of peripheral infusion in patients undergoing paclitaxel and carboplatin chemotherapy. Oya M, Murayama R, Oe M, Tanabe H, Yabunaka K, Komiyama C, Sanada H.
2. Journal Incentive Award. 2018.The 6 th Annual conference of the society for Nursing Science and Engineering. Blood collection assistance device for self-monitoring blood glucose in elderly patients with diabetes. Arai R, Murayama R, Oe M, Tanabe H, Iizuka Y, Komiyama C, Kadowaki T, Sanada H. Journal Incentive Award. 2017. The 5 th Annual conference of the society for Nursing Science and
3. Engineering. Relationships between foot muscular strength and plantar pressure, shear force, and lower back and dorsum pedis angular velocity in patients with diabetes : Examination using a new simultaneous measurement method of plantar pressure, shear force, and lower back and dorsum pedis angular velocity in four patients with diabetes. Takahashi M, Noguchi H, Oe M, Kuramochi E, Ohashi Y, Amemiya A, Takano M, Murayama R, Mori T, Ueki K, Kadowaki T, Sanada H, and Komiyama C.

Competitive Research Fundings

1. 2020 JSPS KAKENHI Grant-in-Aid for ScientificResearch (B). JP20H03976 Management criteria of peripheral intravenous catheter placement for preventing catheter failure; development and spreading with the Japanese version, PI : Murayama R, CI: Abe M
2. 2019 JSPS KAKENHI Grant-in-Aid for Challenging ExploratoryResearch. AR 技術の援用による新人看護師向け穿刺技術自己学習システム JP19K22742, PI: Sanada H, CI: Murayama R (英文表記検討中)
3. 2019 JSPS KAKENHI Grant-in-Aid for ScientificResearch (C) Eliminate the difficulty of venous puncture in patients receiving antineoplastic agents- Development of a new strategy for the prevention of induration. PI: Matsui Y, CI: Murayama R
4. 2019 Yasida Memorial Foundation; Cancer Nursing Research A. Early detection of extravasation using a liquid thermo-sensitive film in the patients receiving chemotherapy. PI: Abe M
5. 2017 JSPS KAKENHI JP17H06645. Grant-in-Aid for Research ActivityStart-up. Establishment of evaluation method of induration following anticancer drug administration using ultrasound elastography. PI: Abe M

Division of **Care Innovation**

Department of Reverse Translational Research

Project Associate Professor, Makoto Oe *PhD, RN, PHN* April 2017–March 2020
Current: Kanazawa University, Professor

Collaborative Department
Professor, Hiromi Sanada *PhD, RN, WOCN, FAAN* April 2017–Present

Aims and Achievements

In order to provide a "medical care that cures and supports", it is necessary to develop novel care products to overcome the problems people encounter in daily life due to individual health difficulties. Conventionally, translational research that the knowledge obtained from the results of basic medical and biological research is translated into clinical research, which then leads to the development of efficient and effective pharmaceuticals and medical devices for practical use has been conducted. However, the findings from basic research studies are not always applicable to humans, and as a consequence, product development cannot proceed. Especially in the field of nursing, which supports life, not all basic research findings can be adapted in clinical practice. Newly developed nursing techniques need to be based on peoples' needs and the "environment" who cares.

In the department of reverse translational research (RTR), we aimed to create needs-oriented care by elucidating the mechanism of knowledge clarified in clinical research and making things, and then conducting clinical evaluation, as well as translational research from conventional basic research to clinical practice. In collaboration with researchers in engineering and biology, we conducted interdisciplinary studies and we have successfully elucidated important mechanisms and factors of pressing nursing problems. These findings have been published in peer-reviewed academic journals, including 11 English papers and 1 Japanese paper, and presented at international (4 reports) and domestic conferences (21 reports).

Contribution to Care Innovation

In this field, based on the diabetic foot prevention clinic at The University of Tokyo Hospital, we use RTR by understanding the clinical need for the prevention of diabetic foot ulcers, elucidation of factors, manufacturing, and clinical evaluation, and present a clinical model of RTR in nursing science.

Extraction of Clinical Needs: Diabetic Foot Prevention Clinic using Yisualization Technique

Based on the results from a survey of patients with diabetes visiting the outpatient department of diabetes and metabolism [1,2], we have focused on the prevention of non-ulcerative lesions that cause diabetic foot ulcers. Callus, one of the non-ulcerative lesions, is formed by repeated application of external forces, and if left untreated can cause severe damage to the subcutaneous tissue. Patients with diabetic neuropathy, who do not feel pain and cannot notice the damage to the callus tissue, are at increased risk for ulceration. Therefore, thermography has been used at this clinic to prevent the development of diabetic foot ulcers, as it represents a method for direct visualization of foot skin that enables objective assessment of inflammation to identify high-risk calluses before ulceration to provide appropriate care [3,4,5].

Factor Elucidation: Collaboration with Biological Researchers

Regarding the factors that lead to callus formation in diabetic patients, the effects of shearing forces and the possible suppression of desmocollin 1 degradation were revealed in joint research studies with engineering [6] and biological researchers [7].

With respect to elevated skin temperature observed by thermography, it was necessary to clarify whether this is associated with inflammation. In collaboration with biology researchers, TNFα in the callus was detected by the non-invasive skin blotting method and it was shown that increased levels of TNFα were associated with an increase in skin temperature, monitored by thermography, with a sensitivity of 0.67, specificity of 0.83, a positive predictive value of 0.73, and a negative predictive value of 0.79. These results suggest that this can be sufficiently used as a screening tool for calluses at high risk of foot ulceration with inflammation.

Manufacturing: Collaboration with Engineering Researchers

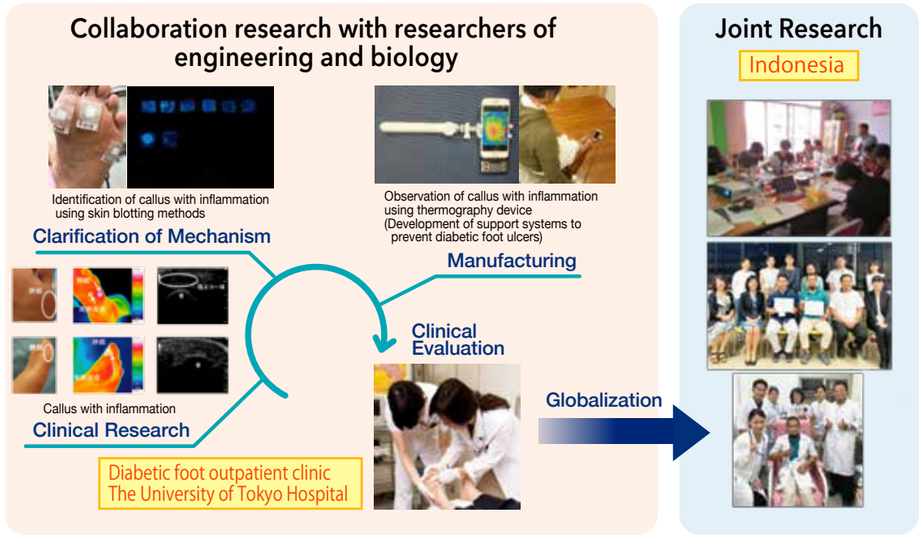
As for manufacturing related to callus in diabetic patients, we have been working closely with engineering researchers to develop software that measures and visualizes shear forces during walking [8].

With respect to thermography, we prepared a device that patients with diabetes themselves can use to identify high-risk conditions and promote self-care so that they can monitor their feet status at home. Although this still needs improvement, patients themselves were able to identify daily life activities that cause an increase in skin temperature of the callus, highlighting thus the effectiveness of this device [9].

Clinical Evaluation

In order to determine the effectiveness of the visualizing technique in preventing the development of ulcers at the clinic, the incidence of foot ulcers at the specific clinic was examined. Results showed that the 12-month cumulative incidence was 0.2%, which was lower than in Europe and the United States. This suggests that the specific outpatient clinic is successful in preventing diabetic foot ulcers development. Based on these findings, we are currently carrying out a project to introduce a diabetic foot prevention clinic using he visualization technique in Indonesia [10].

Through the above process, we presented a model of RTR in nursing science that has undergone clinical field-based needs extraction, factor elucidation, manufacturing, and clinical evaluation, using preventive care for diabetic foot ulcer as an example.



Outline of research on reverse translational research

Link to the Mission of GNRC

By carrying out research with researchers in molecular biology and engineering, we contributed to the establishment of innovative nursing research fields through interdisciplinary fusion. In addition, we carried out research involving postdocs and graduate students as collaborators and contributed to the development of young researchers. Furthermore, our research findings have been submitted to international journals in English and have been globally disseminated.

The knowledge and experience accumulated in this field was systematized through the GNRC-sponsored introductory seminar and the hands-on seminar on nursing science and engineering and was disseminated to researchers in nursing science and other related fields. These efforts are considered to serve as the basis for the development of RTR.

Future Directions

We have used RTR based on clinical needs, and informed a new diabetic foot prevention clinic using visualization technique, and demonstrated its effectiveness. The key reasons for the success of RTR in nursing science are: 1) the ability to have a standard clinical site for daily research activities and 2) the constant presence of biology and engineering researchers in the center to conduct the research necessary to elucidate the important factors and guide the developmental process. It should be highlighted that such environment is very important and should be established in the future to foster young researchers who can use RTR to solve other problems in nursing science and guide clinical practice.

References

1. Oe M, Sanada H, NagaseT, OhashiY, Ueki K, Kadowaki T. Foot complication of patients with diabetes in a university hospital; Based on the risk categorization system of the International Consensus on the diabetic foot. Journal of Japanese Society Wound, Ostomy and Continence Management. 2012;16(3):268-77. Japanese.
2. Oe M, Takehara K, Ohashi Y, Mugita Y, Murayama R, Komiyama C, et al. The incidence of foot ulcers in patients with diabetes at a university hospital in Tokyo over a 5-year period. Diabetol. Int. 2015;6(1):55-9.
3. Nishide K, Nagase T, Oba M, Oe M, Ohashi Y, Iizaka S, et al. Ultrasonographic and thermographic screening for latent inflammation in diabetic foot callus. Diabetes Res. Clin. Pract. 2009;85(3):304-9.
4. Mori T, Nagase T, Takehara K, Oe M, Ohashi Y, Amemiya A, et al. Morphological pattern classification system for plantar thermography of patients with diabetes. J Diabetes Sci Technol. 2013;7(5):1102-12.
5. Oe M, Takehara K, Noguchi H, Ohashi Y, Amemiya A, Sakoda H, et al. Thermographic findings in a case of type 2 diabetes with foot ulcer due to callus deterioration. Diabetol. Int. 2017;8:328-33.
6. Hamatani M, Mori T, Oe M, Noguchi H, Takehara K, Amemiya A ,et al. Factors associated with callus in diabetic patients, focused on plantar shear stress during gait. J Diabetes Sci Technol. 2016;10(6):1353-9.
7. Tsuruoka K, Oe M, Minematsu T, Tomida S, Ohashi Y, Mori Y, et al. Skin characteristics associated with foot callus in people with diabetes: A cross-sectional study focused on Desmocollin1 in corneocytes. J. Tissue Viability 2020;29(4):291-6.
8. Noguchi H, Oe M, Takehara K, Mori T, Sanada H. Reliability and validity of an on-site measurement and visualization system to measure plantar pressure and shear force in footwear for the education of diabetic patients. Journal of Japanese Society Wound, Ostomy and Continence Management. 2015;19(3):327-35.
9. Oe M, Tsuruoka K, Ohashi Y, Takehara K, Noguchi H, Mori T, et al. Prevention of diabetic foot ulcers using a self-monitoring device smartphone and mobile thermography : Case study. J Wound Care. 2021;30(2):116-9.
10. Oe M, Takehara K, Suriadi, Sanada H. Introduction of care to prevent diabetic foot ulcer in Indonesia. Japanese Journal of Foot Care. 2018;16(2):80-4.

Competitive Research Fundings

1. 2019 JSPS-DG-RSTHE Joint Research Program. The Introduction of Diabetic Foot Care Nursing in Indonesia and a Verification of Its Effects on Diabetic Foot Ulcer Prevention. PI: Hiromi Sanada.
2. 2017 JSPS KAKENHI Grant-in-Aid for Scientific Research C Grant Number 17K12209. Development of the systems for prevention of diabetic foot ulcers using thermography. PI: Makoto Oe, CI: Hiromi Sanada, Kimie Takehara, Hiroshi Noguchi.

Division of Nursing Systems

Department of

Health Quality and Outcome Research

Health Quality and Outcome Research for Family Study Group

Professor, Kiyoko Kamibeppu, *PhD, RN, PHN, FAAN* April 2017–Present

Senior Assistant Professor, Iori Sato, *PhD, RN, PHN* April 2017–Present

Assistant Professor, Sachiko Kita, *PhD, CNM, RN, PHN* April 2017–Present

Takafumi Soejima, *PhD, RN* April 2017–Present

Postdoctoral fellow, Hiromi Tobe, *PhD, RN* April 2018–August 2018
Current: GNRC, Project assistant professor

Mariko Sakka, *PhD, RN, PHN* April 2017–March 2018
Current: Department of Gerontological Home Care and Long-term Care Nursing, Assistant Professor

Mayuki Morisaki, *PhD, RN, PHN* April 2019–Present

Project Researcher, Rei Oshiro, *PhD, RN, PHN* October 2020–Present

Aims and Achievements

In this group, not only the individual care recipient, but also the whole family are considered the “a group of care recipients”. This group aims to develop a methodology that can better evaluate the health quality of the whole family as “a group of care recipients” and develop an effective nursing care system that can fit with “what they want to be”. The results of our studies targeting families with various backgrounds and stages were published in academic journals as 38 English papers and 9 Japanese papers, and were reported at international academic conferences (25 reports) and domestic academic conferences (55 reports), some of which were highly evaluated (Awarded 5 times at international conferences and 4 times at domestic conferences).

Contribution to Division of Nursing Systems

This group assists families with various backgrounds and cultures, by developing a Japanese version of the Pediatric Quality of Life Inventory (PedsQL) that evaluates the QOL of developing children from the perspectives of both the individual and their parents [1], and confirming the applicability of QOL to healthy children[1], and children with health problems [2,3,4]. Our research entails the development of evaluation systems such as measuring the readiness of children with chronic diseases to the implementation of these practices in the clinical setting. In recent years, with the rapid progress of pediatric medicine, the number of children with chronic pediatric disease who reach adulthood have been increasing. According to this, the importance of “transitional care/support”, which supports and helps pediatric patients and families to understand and manage the disease and smoothly transition to the adult health system from the pediatric health system, has been increasing in clinical settings.

In order to promote effective transitional support in clinical settings, we needed to develop an evaluation scale that can appropriately evaluate the readiness of transitions from pediatric to adult health system for children with chronic diseases. Therefore, as the first step, we have developed a Japanese version of TRANSITION-Q that measures the readiness of transitions, and confirmed its reliability, validity, and feasibility in clinical settings [5]. After testing the validity of TRANSITION-Q, we instigated a task force in collaboration with the Department of Pediatrics at The Univeristy of Tokyo Hospital that aimed to develop and apply effective transitional support in clinical practice. After achieving this, we launched a “Transitional care outpatient clinic” for adolescents with chronic pediatric diseases and their families in 2016. The effects of the transitional care outpatient clinic have been tested using a randomized controlled trial and have been confirmed to improve the readiness of the pediatric patients. So far, approximately 180 pediatric patients with chronic pediatric disease and their families have visited the transitional support outpatient clinic (Figure 1, 2).

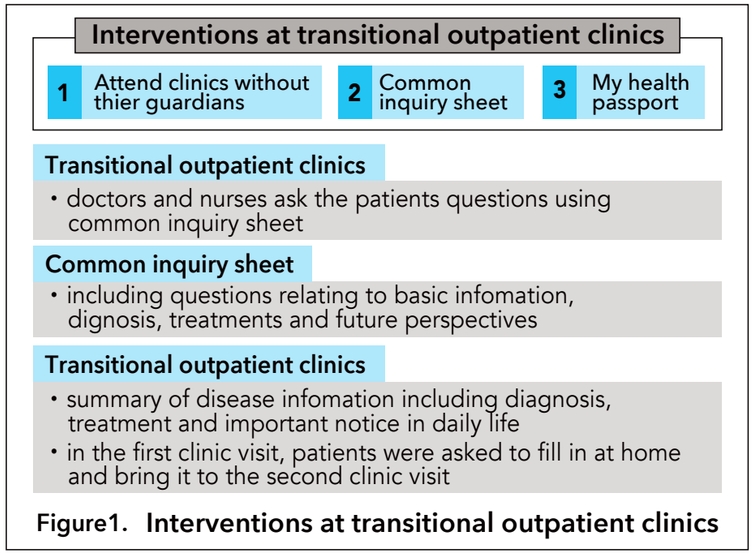


Figure1. Interventions at transitional outpatient clinics

Figure2.
Pamphlet(left) and Health Passport(right) of the transitional outpatient clinic

Link to the Mission of GNRC

This group has been conducting research to develop a methodology that evaluates the health quality of the whole family by taking into account both the patient, patient family and the nursing care. Our developed system has the potential to prevent health problems up to three generations ahead of time using preventative nursing science. In addition to this, we have accepted three postdoctoral fellows in order to help young researchers become leaders in nursing research around the world. To educate those postdoctoral fellows, we have invested in internationally renowned researchers, such as Dr. Pamela Hinds, Director of The Children's Research Institute, Dr. Edward Chan Ko Ling, Professor of Hong Kong Polytechic University, Dr. Joan Haase, Professor of Indiana University, Dr. Denise Saint Arnault, Professor of University of Michigan, and Dr. Susan Bogels, Professor of University of Amsterdam. Since then, we have developed five international joint research projects with interdisciplinary research teams.dissemination of health quality research in midwifery in Japan.

Future Directions

Over the last four years, GRNC's health quality outcomes research has generated and established innovative and systematic research methodologies based on the rapid expansion of multidisciplinary and international networks. In the future, we would like to further expand the network, systematize health quality outcomes and the nursing sciences that support them, and enhance our presence as a global research and care development hub in the nursing field. Going forward, we hope to contribute to the realization of a society that helps maintain the happiness and health of patients and families.

References

1. Kobayashi K, Kamibeppu K. Quality of life reporting by parent-child dyads in Japan, as grouped by depressive status. Nurs Health Sci. 2011;13(2):170-7.
2. Kobayashi K, Nakagami-Yamaguchi E, Hayakawa A, Adachi S, Hara J, Tokimasa S, et al. Health‐related quality of life in Japanese children with acute lymphoblastic leukemia during and after chemotherapy. Pediatr. Int. 2017;59(2),145-53.
3. Sato I, Higuchi A, Yanagisawa T, Mukasa A, Ida K, Sawamura Y, et al. Development of the Japanese version of the Pediatric Quality of Life Inventory™ Brain Tumor Module. Health Qual. Life Outcomes 2010;8(1):38.
4. Kikuchi R, Mizuta K, Urahashi T, Sanada Y, Yamada N, Onuma E, et al. Development of the Japanese version of the PedsQL™ transplant module. Pediatr. Int. 2017;59(1):80-8.
5. Morisaki-Nakamura M, Suzuki S, Kobayashi A, Kita S, Sato I, Iwasaki M, et al. Development and validation of a Japanese version of the TRANSITION-Q. Pediatr. Int. 2020; Forthcoming.

Awards

1. Best Poster Presentation Award. 2020. 23nd East Asian Forum of Nursing Scholars. Association between transition readiness and characteristics of adolescents with chronic diseases in Japan. Morisaki-Nakamura M, Suzuki S, Kobayashi A, Iwasaki M, Hirata Y, Sato A, Kita S, Sato I, Kamibeppu K.
2. Fellow of American Academy of Nursing. 2019. American Academy of Nursing. Kamibeppu K.
3. Travel Award. 2019. 24th Congress of Asia-Pacific Blood Marrow Transplantation & The International Congress of BMT. Informational needs and Quality of Life of allogeneic hematopoietic stem cell transplant recipients and their caregivers visiting long-term follow-up clinics within one and half years. Nakajima S, Nakano S, Nakanishi S, Isono S, Kobayashi K, Masamoto Y, Kurokawa M, Kamibeppu K.
4. International Psychology Poster Contest Third Placing. 2019. Annual Convention of American Psychological Association 2019. Influences of the type and the experienced form of trauma on posttraumatic growth. Kibi S, Qandeel M, Soejima T, Oshiro R, Hiraki K, Kamibeppu K, Taku K.
5. The President's Award for Oral Presentation. 2019. 55th Annual Meeting of the Japanese Society of Pediatric Cardiology and Cardiac Surgery. Efficacy of a transitional support program among adolescents with cardiac diseases: a randomized controlled trial. Morisaki-Nakamura M, Suzuki S, Kobayashi A, Kita S, Sato I, Iwasaki M, Hirata Y, Sato A, Oka A, Kamibeppu K.
6. Excellence in Family Nursing Award. 2019. International Family Nursing Conference 2019. Kamibeppu K.
7. Research Encouragement Award. 2019. 5th Annual Meeting of the Japanese Association for Research in Family Nursing. Nursing support for family decision-making regarding treatment for a neonate with a life-threatening condition. Suzuki S, Oshiro R, Kobayashi A, Kamibeppu K. Journal of Family Nursing. 2019; 24(2): 185-196.
8. EBMT Nurses Group Award for Best Oral Presentation. 2018. 44th Annual Meeting of the European Society for Blood and Marrow Transplantation. Preditcors of parental psychological distress during the acute phase of pediatric hematopoietic stem cell transplantation in Japan: A multicenter prospective longitudinal study. Nakajima S, Setoyama A, Sato I, Fukuchi T, Tanaka H, Inoue M, Watanabe K, Koh K, Takita J, Tokuyama M, Watanabe K, Kamibeppu K.

9. Encouragement Award. 2017. 39th Annual Meeting of the Japanese Society for Hematopoietic Cell Transplantation. Association with Quality of Life and chronic graft-versus-host disease of patients visited long-term follow-up clinic after pediatric hematopoietic stem cell transplantation. Nakajima S, Oshiro R, Iwasaki M, Satake K, Sato I, Hiwatari M, Takita J, Kamibeppu K.

Competitive Research Fundings

1. 2020, JSPS KAKENHI Grant-in-Aid for Challenging Research (Exploratory), Grant Number 20K21701. Both Lives-Narratives of family experiences of pregnant women with cancer and the development of a decision support model. PI: Kamibeppu K, CI: Haruna M, Fujii T, Osuga Y.
2. 2020, JSPS KAKENHI Grant-in-Aid for Scientific Research (B), Grant Number 20H03994. Development of a support program using patient-reported outcomes to improve cognitive function and QOL of survivors from pediatric brain tumor. PI: Sato I, CI: Soejima T.
3. 2020, JSPS KAKENHI Grand-in-Aid for Young Scientist, Grant Number 20K19126. Development of a family care model to prevent and terminate family poly-victimization. PI: Kita S.
4. 2020, JSPS KAKENHI Grand-in-Aid for Young Scientist, Grant Number 20K19166. Development of the Japanese version of the parenting style and dimensions questionnaire and community-based participatory research to support appropriate parenting. PI: Tobe H.
5. 2020, Zonta Club of Tokyo Ⅰ. Research on health-related QOL of wives of overseas dispatched returnees. PI: Imai S.
6. 2019, JSPS KAKENHI Grant-in-Aid for Scientific Research (B), Grant Number 19H03941. Establishment of health quality & outcome research for diversity of families. PI: Kamibeppu K, CI: Haruna M, Miyamoto Y, Sato I.
7. 2019, The Children's Cancer Association of Japan. Verification of resilience model and related factors in adolescent and young adult with of childhood cancer survivors. PI: Kamibeppu K, CI: Murata S.
8. 2019, Japan Cancer Society, RFL Project Mirai Cancer Research Grants. Both Lives-The experiences of pregnant woman with cancer and their family and the support to their decision-making. PI: Kamibeppu K.
9. 2019, JSPS KAKENHI Grand-in-Aid for Young Scientist, Grant Number 19K19639. Development of support program focusing on family functioning for quality of working life among cancer survivors. PI: Soejima T.
10. 2019, JSPS KAKENHI Grand-in-Aid for Research Activity Start-up, Grant Number 19K24224. Development of the effective transitional support system for patients with childhood-onset chronic diseases: Focusing on the parent-child relationships. PI: Morisaki M.
11. 2019, SGH Foundation. Relationship between family-centered care and work-life balance in parents of hospitalized children with cancer. PI: Kobayashi A.
12. 2018, Gold Ribbon Network. Clarification of the mechanism for the impact of change of working condition on QOL in parents of children with cancer: Development of the parental belief scale for change of working condition. PI: Kamibeppu K, CI: Sato I, Soejima T, Kobayashi A.
13. 2018, The Children's Cancer Association of Japan. Quality of Life among infants with acute lymphoblastic leukemia and their family in clinical study（JPLSG-MLL-17）. PI: Kamibeppu K, CI: Sato I, Soejima T, Maeda M, Ishida Y, Hayakawa A, Miyamura T.
14. 2018, Japan Cancer Society, RFL Project Mirai Cancer Research Grants. The impact of the online peer support group to loneliness among cancer patients. PI: Kamibeppu K.
15. 2018, Japanese Council of Senior Citizens Welfare Service. The impact of end-of-life care on complicated grief with family caregivers of residents in nursing homes. PI: Kamibeppu K, CI: Fukui C.
16. 2018, JSPS KAKENHI Grand-in-Aid for Research Activity Start-up, Grant Number 19K21447. Development and evaluation of mindful parenting program: a randomized controlled trial. PI: Tobe H.
17. 2018, General Incorporated Association Foundation of Global Life Learning Center. The efficacy of a resilience-enhancement program for mothers in Japan based on emotion regulation: a randomized controlled trial. PI: Tobe H.
18. 2018, Japan Hospice Palliative Care Foundation. Validation of care evaluation scale 2.0 in nursing homes: measuring satisfaction with end-of-life care for persons with dementia. PI: Fukui C, CI: Kamibeppu K.
19. 2018, The Mitsubishi Foundation. A longitudinal study of the impact of nursing care on health-related quality of life for children with medical complexity in special needs school. PI: Suzuki S, CI: Kamibeppu K.
20. 2018, Yamaji Fumiko Nursing Research Fund. Quality of Life and informational needs of hematopoietic stem cell transplant recipients and caregivers visiting long-term follow-up clinics: A multicenter cross-sectional study. PI: Nakajima S, CI: Kamibeppu K.
21. 2018 Yamaji Fumiko Nursing Research Fund. Posttraumatic growth among children of breast cancer survivors and its related factors: Development of the communication scale between breast cancer survivors and their children. PI: Oshiro R, CI: Kamibeppu K.
22. 2018, Kobayashi Aoitori Foundation. Development and evaluation of the cancer education fostering the positive attitudes toward children with cancer provided with children attending regular class. PI: Kibi S, CI: Kamibeppu K, Soejima T.
23. 2017, Gold Ribbon Network. Impact of change of working condition on QOL in fathers and mothers who have hospitalized children with cancer: Cross-sectional study focusing on parental beliefs for taking care of their children. PI: Kamibeppu K, CI: Sato I, Nakajima S, Kobayashi A.
24. 2017, The Mental Health Okamoto Memorial Foundation. Development of lectures to help students promote an attitude of acceptance for diverse children by raising awareness of childhood cancer. PI: Kamibeppu K, CI: Soejima T, Hoshi Y.
25. 2017, JSPS KAKENHI Grand-in-Aid for Young Scientist, Grant Number 17K17464. Development and effects of a perinatal health program to improve mental health and parenting after childbirth among pregnant women exposed IPV. PI: Kita S.
26. 2017, JSPS KAKENHI Grand-in-Aid for Research Activity Start-up, Grant Number 17H06649. Work-life balance among family caregivers of persons with dementia: A longitudinal study. PI: Sakka M.
27. 2017, Yamaji Fumiko Nursing Research Fund. A study of respite care and health-related quality of life for children with medical complexity in home health care. PI: Suzuki S, CI: Kamibeppu K.
28. 2017, Yamaji Fumiko Nursing Research Fund. Development of the disease awareness scale among adolescents with childhood-onset chronic disease and exploration of its related factors. PI: Nakamura M, CI: Kamibeppu K.
29. 2017, Zonta Club of Tokyo Ⅰ. The research for mental health in breast cancer patients and their family members. PI: Oshiro R.
30. 2017, Policy–based Medical Services Foundation. Relationship between fatigue and family functioning in children with cancer undergoing treatment in the hospital: A cross–sectional study. PI: Murata S, CI: Kamibeppu K, Soejima T, Suzuki S.

Division of Nursing Systems

Department of

Health Quality and Outcome Research

Health Quality and Outcome Research for Women Study Group

Professor, Megumi Haruna *PhD, RNM* April 2017–Present

Assistant Professor, Emi Sasagawa *PhD, RNM* April 2017–Present

Kaori Yonezawa *PhD, RNM* April 2017–Present

Naoko Hikita *PhD, RNM* April 2017–March 2020
Current: Dokkyo Medical University, Senior Assistant Professor

Yuriko Usui *PhD, RNM* April 2020–Present

Aims and Achievements

Our group aims to explore the women’ s health throughout their entire lifespan, focusing on the maternal and child health during perinatal period. Continuous and comprehensive support throughout pregnancy, childbirth, postpartum and childcare is regarded as the key role of midwives as professionals. Midwives make it their mission to build evidence for the effectiveness of support and solve the perinatal problems.

We conduct the far-sighted research considering the future of coming babies and their expected families, emphasizing the narratives of women on how they spend their pregnancy and how they experience childbirth and child rearing. We aim to generate knowledge to improve the comprehensive health quality from the time of conception to child-rearing and throughout the lifespan, as well as knowledge to prevent health problems in the next generation. Our group’ s current research takes a long-term perspective to analyze factors directly related to the lives of pregnant women and child-rearing mothers, using a combination of objective and subjective indicators. We strive to contribute to both research and clinical practices. Our research results were published in 27 papers in international academic journals and in 6 papers in national academic journals. One of these publications was honored as the magazine's Best Download awards. Our research results were also presented at international (two reports) and national (26 reports) conferences. Two of these reports were awarded in the national conferences.

Contribution to Division of Nursing Systems

Our research studies especially focused on “lifestyle related to nutrition, exercise, and mental health during pregnancy” and "family life and parenting." Our aim is to contribute to the improvement of comprehensive health quality from pregnancy to postpartum. Perinatal health education regarding diet and exercise during pregnancy, which imposes restrictions and burdens on pregnant women, has been provided in clinical settings. The Developmental Origins of Health and Disease (DOHaD) hypothesis postulates that maternal environment during pregnancy affects children’ s metabolic profile over their entire lifespan, which has been attracting a growing attention. Thus, nutritional status during pregnancy is important for pregnant women, as well as for preventing health problems of the next generation. However, there are a few studies on the desirable nutritional intake during pregnancy, and there are not enough nutritional assessment tools for pregnant women. Therefore, we have examined and confirmed the validity and reliability of a self-administered diet history questionnaire among pregnant women [1)], and we clarified factors affecting the nutritional status of pregnant women, such as skipping breakfast [2)] and vegetable intake [3)], using the validated questionnaire. We are conducting further studies exploring the relationship between dietary intakes, gestational weight gain, and birth outcomes, especially among low-birth-weight infants.

In addition, it is necessary for the nutritional status of pregnant women to consider not only diet but also exercise and physical activity. We translated and evaluated the pregnancy physical activity questionnaire and clarified the exercise and physical activity among pregnant women in Japan and its related factors [4, 5)]. We could verify the effects of yoga exercise and a nutritional guidance program during pregnancy [6)].

From the perspective of preventing health problems of the next generation, it is important to improve health status for reducing the risks of low-birth weight infants. Smoking is also known to increase the risk of having a low-birth-weight infant. Our studies revealed that non-smoking pregnant women who are exposed to second-hand smoke absorbs nicotine comparable to that of the smoking person depending on the smoking situation of the family [7, 8)]. The importance of health literacy was also revealed by a study on the utilization of maternal and child health handbook [9)]. We are also conducting research regarding the risk of delivery in Mongolia and El Salvador, as well as in Japan [10, 11)]. We examined ways to improve the health quality of women considering the next generation even in different situations around the world. Recently, the health status of pre-pregnancy women has been attracting attention as pre-conceptual care. We examined the influence of lower pre-pregnancy Body Mass Index on the gestational weight gain [12)] and factors related to

improve the health quality of women considering the next generation even in different situations around the world. Recently, the health status of pre-pregnancy women has been attracting attention as pre-conceptual care. We examined the influence of lower pre-pregnancy Body Mass Index on the gestational weight gain [12] and factors related to anemia among adult women [13]. From these studies, we are examining how to approach pre-pregnant women in the future.

Furthermore, we have obtained new findings on women's health support, including the effects of perinatal mental health, such as the Intimate Partner Violence (IPV), during pregnancy and fear of childbirth [14,15]. One of the studies that contributes to the health quality of the child-rearing period focused on mothers in need of help even if they looked fine and have problems with the health quality of their families. Therefore, we validated the Japanese version of the Karitane Parenting Confidence Scale, which was developed in Australia to measure the self-efficacy of infants' parents [16]. In future studies, we are planning to investigate factors that enhance parental self-efficacy and intervention methods.

Newborns' skin problems are a major concern for caregivers. It is estimated that about 50-80% of neonates experience skin problems, which affect their life. Caregivers are more likely to be worried because the newborns' skin problems are noticeable. Newborn babies may also be in pain and newborns' skin problems are also associated with future allergic diseases, such as atopic dermatitis. Therefore, skin care methods were needed to prevent such problems.

In our laboratory, we conducted a randomized controlled trial of healthy newborn to compare between babies who were given moisturizing care (bathing once every two days and applying moisturizer every day) to those who were given normal care (bathing every day) until 3 months of age. The results showed that the moisturizing care group showed a better skin barrier function at 3 months of age and lower incidence of diaper dermatitis within 1 month of age [17]. The results also confirmed that the assessment of skin problems based on the mother's records had validity [18]. This study opened the way to study skin problems based on the parents' assessment. Besides, a 2-year follow-up revealed that the presence of symptomatic skin problems, even for a relatively short period of more than 3 days or even more than 7 days before 3 months of age, increased the risk of developing atopic dermatitis and food allergies at 2 years of age [19].

The studies above included a collaboration with Professor Robert Boyle, Imperial College London, England, and his team, who are conducting a prospective individual data meta-analysis [20]. Many studies have been planned by allergists and dermatologists for high-risk allergic children, such as those with a family history of allergies, but studies for all healthy newborns are rare worldwide. Our aim was to answer the question "What should caregivers do with their newborns' skin care?" because our perspective of supporting child rearing, not only preventive allergies. We believe this perspective contributed to the cutting-edge research on allergy prevention as valuable data.

Link to the Mission of GNRC

Since 2017, our group has made efforts to train young researchers, which resulted in the graduation of two doctoral students and 16 master's students from our department. Through different educational activities, we collaborated with researchers from the Department of Social Prevention and Epidemiology, The University of Tokyo, and the St. Luke's International University, and allergy specialists from other institutions. Field studies conducted in Mongolia and El Salvador have contributed to the development of a midwifery education system and personnel development through the collaboration with the local stakeholders and local researchers. As mentioned above, our researcher have also participated in international joint research regarding the newborns skin troubles with Imperial College London. Another collaborative research project about midwifery education using virtual reality was also established on the occasion of the visit of the Associate Professor Patrea Anderson of the University of The Sunshine Coast, Australia, to the GNRC in 2019, and is currently underway. Recently, we have increased opportunities to provide recommendations for the midwives and the public. We believe that these academic activities will be a fundamental for the

Future Directions

Through the past four years, our research has deepened to the stage where it can be applied to clinical practice. We aim to expand our research network and develop the methodology to comprehensively evaluate and support the entire life of women, newborns, and their families. Previously, most of our research were conducted in the neighborhood of the university or in one region overseas. In the future, we plan to conduct national and international joint research at multiple level of medical facilities to make our research content more useful for a wider range of subjects. Most of our research was conducted with methodological development and evaluation of patients as outcomes. Thus, we would like to develop innovative cares based on the research findings to introduce the evaluation toward care, and to examine new health quality indices.

References

1. Shiraishi M, Haruna M, Matsuzaki M, Murayama R, Sasaki S. Availability of two self-administered diet history questionnaires for pregnant Japanese women: A validation study using 24-hour urinary markers. Journal of Epidemiology. 2017 Apr;27(4):172-9.
2. Shiraishi M, Haruna M, Matsuzaki M. Effects of skipping breakfast on dietary intake and circulating and urinary nutrients during pregnancy. Asia Pacific Journal of Clinical Nutrition. 2019;28(1):99-105.
3. Takei H, Shiraishi M, Matsuzaki M, Haruna M. Factors related to vegetable intake among pregnant Japanese women: A cross-sectional study. Appetite. 2019 Jan 1;132:175-81.
4. Haruna M, Matsuzaki M, Shiraishi M, Yeo S. Physical exercise during pregnancy and its related factors: An observational study in Japan. Asian/Pacific Island Nursing Journal. 2017;2(4):166-73.
5. Kikuchi-Noguchi H, Shiraishi M, Matsuzaki M, Haruna M. Physical activity levels in the second trimester of pregnancy and related demographic factors: A cross-sectional secondary data analysis. Cogent Medicine. 2019;6:1704607.

6. Matsuzaki M, Kusaka M, Sugimoto T, Shiraishi M, Kobayashi R, Watanabe S, Haruna M. The Effects of a Yoga Exercise and Nutritional Guidance Program on Pregnancy Outcomes Among Healthy Pregnant Japanese Women: A Study Protocol for a Randomized Controlled Trial. Journal of Alternative and Complementary Medicine. 2018;24(6):603-10.
7. Hikita N, Haruna M, Matsuzaki M, Sasagawa E, Murata M, Oidovsuren O, Yura A. Prevalence and risk factors of secondhand smoke (SHS) exposure among pregnant women in Mongolia. Scientific Reports. 2017 Nov 27;7(1):16426.
8. Hikita N, Haruna M, Matsuzaki M, Sasagawa E, Murata M, Yura A, Oidovsuren O. Comparison of Knowledge about smoking and passive smoking and urinary cotinine levels in pregnant women and their partners in Mongolia: A cross-sectional study. Asian/Pacific Island Nursing Journal. 2019;4(1):47-56.
9. Hikita N, Haruna M, Matsuzaki M, Shiraishi M, Takehara K, Dagvadorj A, Sumya N, Bavuusuren B, Baljinnyam P, Ota E, Mori R. Utilisation of Maternal and Child Health handbook in Mongolia: A cross-sectional study. Health Education Journal. 2018;1-12.
10. Hikita N, Haruna M, Matsuzaki M, Sasagawa E, Murata M, Ariunaa Y, Oidovsuren O. Is high maternal body mass index associated with caesarean section delivery in Mongolia? A prospective observational study. Asian/Pacific Island Nursing Journal, 2019;4(3):128-34.
11. Sasagawa E, Elias de Buendia E, Ortiz Avendano GA, Diaz de Navarro AN, Barrera Erazo HA, Sandoval Lopez DX, Cedillos RA, Kita K, Misago C. A Comparison of Blood Loss Determination After Vaginal Delivery in El Salvador: Visual Estimation Versus Direct Measurement. International Journal of Nursing and Health Science. 2017;4(6):81-7.
12. Shiraishi M, Haruna M, Matsuzaki M, Murayama R, Sasaki S. Pre-pregnancy BMI, gestational weight gain and body image are associated with dietary under-reporting in pregnant Japanese women. Journal of Nutritional Science. 2018 Apr 2;7:e12.
13. Hisa K, Haruna M, Hikita N, Sasagawa E, Yonezawa K, Suto M, Ota E. Prevalence of and factors related to anemia among Japanese adult women: Secondary data analysis using health check-up database. Scientific Reports. 2019 Nov 19;9(1):17048.
14. Kita S, Haruna M, Matsuzaki M, Kamibeppu K. Does Antenatal Social Support Affect the Relationships Between Intimate Partner Violence During Pregnancy And Perinatal Mental Health? Violence Against Women. 2019 Apr 3:1077801219835052.
15. Takegata M, Haruna M, Morikawa M, Yonezawa K, Komada M, Severinsson E. Qualitative exploration of fear of childbirth and preferences for mode of birth among Japanese primiparas. Nursing & Health Sciences. 2018 Sep;20(3):338-45.
16. Usui Y, Haruna M, Shimpuku Y. Validity and reliability of the Karitane Parenting Confidence Scale among Japanese mothers. Nursing & Health Sciences. 2019 Aug 1.
17. Yonezawa K, Haruna M, Matsuzaki M, Shiraishi M, Kojima R. Effects of moisturizing skincare on skin barrier function and the prevention of skin problems in 3-month-old infants: A randomized controlled trial. The Journal of Dermatology. 2018;45:24-30.
18. Yonezawa K, Haruna M, Kojima R. Validity of infant face skin assessment by parents at home. Asian/Pacific Island Nursing Journal. 2020;4(4):128-34.
19. Yonezawa K, Haruna M. Short-term skin problems in infants aged 0–3 months affect food allergies or atopic dermatitis until 2 years of age, among infants of the general population. Allergy, Asthma & Clinical Immunology. 2019;15:74.
20. Kelleher MM, Cro S, Cornelius V, Axon E, Lodrup Carlsen KC, Skjerven HO, Rehbinder EM, Lowe A, Dissanayake E, Shimojo N, Yonezawa K, Ohya Y, Yamamoto-Hanada K, Morita K, Surber C, Cork M, Cooke A, Tran L, Askie LM, Duley L, Chalmers JR, Williams HC, Boyle RJ. Skincare interventions in infants for preventing eczema and food allergy. Cochrane Database of Systematic Reviews. 2020, Issue 2. Art. No.:CD013534.

Awards

1. JD Award (Most downloaded paper in 2018, The Journal of Dermatology). 2018. The Journal of Dermatology. Effects of moisturizing skincare on skin barrier function and the prevention of skin problems in 3 month-old infants: A randomized, controlled trial. Yonezawa K, Haruna M, Matsuzaki M, Shiraishi M, Kojima R.
2. Co-medical Aiiku Awards (Excellent Oral Presentation Award). 2017. The 58th Annual Meeting of Japan Society of Maternal Health. A survey of the onset time of skin problems on the face, body, and diaper area of newborns. Shiga S, Haruna M, Yonezawa K.
3. Best Oral Award. 2017. The 35th Tokyo Society of Maternal Health. Factors related to continuing breastfeeding returning to work after maternity leave, Shima S, Haruna M, Matsuzaki M, Sasagawa E, Yonezawa K.

Competitive Research Fundings

1. 2020, Pfizer Health Research Foundation International Joint Research, Evaluation of learning efficacy of Virtual reality on midwifery education: Collaborative research between Japan and Australia, PI: Emi Sasagawa, CI: Megumi Haruna.
2. 2020, The Univers Foundation, Development and verification of an online Japanese version of『Mindfulness based Childbirth and Parenting』for pregnant women, PI: Ayumi Tanke, CI: Megumi Haruna, Emi Sasagawa, Kaori Yonezawa, Yuriko Usui.
3. 2020, the Yamaji Fumiko Nursing Research Fund, Development of a new bathing methods to prevent neonatal skin problems: A prospective observational study. PI: Satsuki Shimizu.
4. 2020, JSPS KAKENHI Grant-in-Aid for Grant-in-Aid for Scientific Research (B), Grant Number 20H03995. Mechanisms of skin problems in newborns elucidated by skin blotting, PI: Kaori Yonezawa, CI: Takeo Minematsu.
5. 2020, General Incorporated Association Japan Academy of Midwifery, Relationship between Dietary Intake during Labor and Birth Outcomes, Maternity Fatigue, and Satisfaction with childbirth, PI: Kaori Yonezawa, CI: Megumi Haruna, Nanako Fujiwara.
6. 2020, Grant-in-Aid for Research Activity Start-up, Grant Number 20K23128. Development of a brief scale for the Japanese version of the Wijma Delivery Expectancy/Experience Questionnaire, PI: Yuriko Usui.
7. 2019, General Incorporated Association Japan Academy of Midwifery, Factors related to minor troubles among working pregnant women and their impact on labor productivity, PI: Emi Sasagawa, CI: Megumi Haruna.
8. 2019, Grant-in-Aid for Early-Career Scientists, Grant Number 19K19667. The effect of smoking and second-hand smoke on perinatal outcome among pregnant women in Mongolia, PI: Naoko Hikita.
9. 2019, JSPS KAKENHI Grant-in-Aid for Grant-in-Aid for Scientific Research (B), Grant Number 19H03940. Optimal gestational weight gain in each trimester and related health behavior and psycho-social factors: A Cohort Study, PI: Megumi Haruna, CI: Naoko Hikita.
10. 2019, JSPS KAKENHI Grant-in-Aid for Challenging Research (Exploratory), Grant Number 19K22741. Associations between maternal circadian rhythm, daily eating schedules and nutritional metabolism during pregnancy, PI: Megumi Haruna, CI: Emi Sasagawa, Kaori Yonezawa.
11. 2019, the Yamaji Fumiko Nursing Research Fund, Development and dissemination of tool to care pelvic floor disorders among postpartum women, PI: Yurie Asai.
12. 2019, the Kimura Foundation for Nursing Education, Evaluation of the Predictive Validity of an Infant Skin Assessment Tool - Can it predict the onset of atopic dermatitis? -, PI: Moeri Yokoyama, CI: Chieko Oie. Megumi Haruna, Kaori Yonezawa.
13. 2019, Restart-up Research Funding the University of Tokyo, An Investigative Study on Difficulties and Coping Strategies of Pregnant Women with Allergic Diseases, PI: Kaori Yonezawa.
14. 2018, JSPS KAKENHI Grant-in-Aid for Young Scientists, Grant Number 18K17552. Development of care model related to the Humanization of Childbirth and verification of its effectiveness in five pilot hospitals of El Salvador, PI: Emi Sasagawa
15. 2018, General Incorporated Association Japan Academy of Midwifery, Preganncy and Birth Outcomes of In-hospital Midwife-led Care and In-hospital Midwifery Clinic, PI: Megumi Haruna, CI: Emi Sasagawa, Kaori Yonezawa, Naoko Hikita.
16. 2018, General Incorporated Association Japan Academy of Midwifery, The Evaluation of the Reliability and Validity of a Skin Trouble Assessment Scale for Newborns, PI: Kaori Yonezawa, CI: Megumi Haruna.
17. 2018, Meiji Yasuda Mental Health Foundation, Effects of childbirth experience on maternal bonding -Relationship between childbirth experience using the Japanese version of the W-DEQ and bonding disorders-, PI: Yuriko Usui, CI: Megumi Haruna, Emi Sasagawa, Kaori Yonezawa, Naoko Hikita, Maika Setoguchi.
18. 2018, Institute for Food and Health Science, Yazuya Co. Ltd, Evaluation of salt intake using 24 hours urine among medical professional in Darkhan-Uul Province, Mongolia, PI: Naoko Hikita.
19. 2017, JSPS KAKENHI Grant-in-Aid for Grant-in-Aid for Scientific Research (B), Grant Number 17K17676. Effects of skin care on the development of healthy skin barrier function and formation of skin microflora in infants, PI: Kaori Yonezawa.
20. 2017, The Kazuko Takemura Fund for Feminist Research for Gender Equality and Justice, Actual situation of obstetric and midwifery care as gender-based violence: obstetric violence in El Salvador, PI: Emi Sasagawa, CI: Megumi Haruna.
21. 2017, Grant-in-Aid for Research Activity Start-up, Grant Number 17H06647. Actual situation of second-hand smoke among pregnant women in Mongolia, and constructing a second-hand smoke evaluation method, PI: Naoko Hikita.

Division of Nursing Systems

Department of
Health Quality and Outcome Research

Mental Health Quality and Outcome Study Group

Associate Professor, Yuki Miyamoto *PhD, RN, PHN* April 2017–Present

Project Assistant Professor, Ayumi Takano *PhD, RN, PHN* April 2017–March 2018
Current: Tokyo Medical and Dental University, Associate Professor

Akiko Inagaki *PhD, RN, PHN* April 2018–Present

Utako Sawada *PhD, RN* April 2020–Present

Aims and Achievements

Our aim is to improve the quality of life and health quality of patients and their families from their perspectives, including how they live and die. The quality of life and the quality of health vary across individuals and cultures. In the Department of Health Quality and Outcome Research, we are particularly interested in health quality.

We have developed a methodology to better evaluate health quality from patients' and their families' perspectives. We try to implement this methodology in nursing research, medical research, and various other research fields. We aim to generate outcome-based, practical, and integrated insights of care and treatments and insights of nursing and social systems.

The perspective of the care recipient is indispensable for assessing health quality in a the multicultural society. In addition, to evaluate the effects of care that affect health quality, it is necessary to have a methodology that includes the environmental context in the evaluation.

In the Department of Health Quality and Outcome Research, we are developing research with patients and the public in collaboration with research teams from different fields inside and outside GNRC, inside and outside the university. The Mental Health Quality and Outcomes Study Group, one of the study groups in the Department of Health Quality and Outcomes Research, is conducting research especially in mental health.

One of our research topics is "recovery," a concept that has proximity and overlap with quality of life and health quality among people who have experienced mental health difficulties. Recovery is a dynamic concept that includes the restoration of life, which means developing the individuals' aspirations for their life and getting back the life they want to live.

Our recovery-related research activities include developing questionnaires for people with mental health difficulties, accumulating narratives of people who have experienced mental health difficulties, developing care to improve health quality of people with mental health difficulties, and co-producing research with people who have experienced mental health difficulties (patient and public involvement in designing and conducting research).

These achievements have been published in English and Japanese papers in academic journals and reported in books and international and national conferences and symposia.

Contribution to Division of Nursing Systems

One of the Mental Health Quality and Outcomes Study Group's focuses is the development of practices that contribute to the health quality of people who have experienced using mental health services, including psychiatry. These practices include: (1)study of recovery-oriented practices working with people who have undergone psychiatric diagnoses, such as schizophrenia and mood disorders, and who have received psychiatric treatment [1,2,3,4]; (2) development of an evaluation scale directly related to the health quality of the people who have mental health difficulties (development of questionnaires to evaluate one's condition, development of questionnaires to assess the recovery orientation of the service received assessed by the mental health service users) [5,6,7,8,9]; (3) development of substance use prevention programs for people with substance use problems [10,11]; (4) development of care that supports a calm life for people with dementia [12,13]; and (5) other studies related to mental health quality [14,15,16,17,18].

The voice of people who have experience using mental health services is increasing, and recovery-oriented practice has increased worldwide in recent decades and is also on the rise in Japan. Our group has played a key role in the spread of recovery-oriented practices in Japan. Specifically, we worked on introducing the "Recovery College", a recovery-oriented approach with a principle of co-production among people who have experience using mental health services and people who have experience of providing professional support to people with mental health difficulties. We developed guidelines to run recovery colleges [1,19,20,21]. Besides, we have been working on organizing peer support, which is thought to have a significant impact on recovery and considering collaboration between peer support and mental health services [22,23,24,25,26].

Although the above-mentioned recovery-oriented practices and peer support-related practices have been developed in the US and the UK, their transmission and methods cannot be directly applied in Japan due to differences in health and welfare systems and cultural differences. Some recovery-oriented, peer support-related practices and activities have been developed in Japan.

Our multidisciplinary team have been developing mental health care respecting previous activities in Japan and incorporating global trends and new findings from around the globe, contributing to the development of mental health care and Japan's nursing system.

Link to the Mission of GNRC

We are working on developing practice in collaboration with people with mental health difficulties, their families, people involved in health and medical support, and the government, and this collaboration is a fusion of different fields. In addition, we meet and learn directly from leading practitioners in the United Kingdom, the United States, and Northern Europe, who are practicing each of the advanced practices, and we also try to disseminate the development in Japan to foreign countries. We believe that such efforts will significantly contribute to the future development of mental health nursing.

Future Directions

In Japan, mental health care is changing and will increasingly need to emphasize the quality of life and health quality of those who have experienced mental health difficulties.
To provide such care, it is necessary to pursue health quality and care research that involves not only professionals or researchers but also people who have experience of mental health difficulties. Thus, there is a need to share the premise that any person's thoughts and opinions are important and valuable. We aim to improve mental health and medical welfare and to contribute to the realization of a society in which individuals feel that they are respected as they are.

References

1. Recovery college guidance research group. Recovery college guidance: principles and practices. 2019. Available from: http://recoverycollege-research.jp/guidance/
2. Kuribayashi K, Imamura K, Watanabe K, Miyamoto Y, Takano A, Sawada U, et al. Effects of an internet-based cognitive behavioral therapy (iCBT) intervention on improving depressive symptoms and work-related outcomes among nurses in Japan: a protocol for a randomized controlled trial. BMC Psychiatry. 2019;19(1):245.
3. Hiraide R, Miyamoto Y, Tao Y. Effect of Participation in Wellness Recovery Action Plan (WRAP) on Recovery. Seishin Igaku 2018;60(9):1025–35. (in Japanese)
4. Chiba K, Miyamoto Y, Yamamoto N. A phenomenological analysis of the practice of peer support workers in mental health services: bringing the peer's perspective in nursing. Seishinka Kango 2018;45(7):42–53. (in Japanese)
5. Chiba R, Funakoshi A, Yamazaki Y, Miyamoto Y. The Benefit Finding Questionnaire (BFQ): Scale Development, Validation, and Its Psychometric Properties Among People with Mental Illness. Healthcare. 2020;8(3):303.
6. Kanehara A, Kotake R, Miyamoto Y, Kumakura Y, Morita K, Ishiura T, et al. The Japanese version of the questionnaire about the process of recovery: Development and validity and reliability testing. BMC Psychiatry. 2017;17(1).
7. Kotake R, Kanehara A, Miyamoto Y, Kumakura Y, Sawada U, Takano A, et al. Reliability and validity of the Japanese version of the INSPIRE measure of staff support for personal recovery in community mental health service users in Japan. BMC Psychiatry. 2020;20(1):51.
8. Morita Y, Miyamoto Y, Takano A, Kawakami N, Coulombe S. Reliability and validity of the Japanese version of the Mental Health Self-management Questionnaire among people with mental illness living in the community. BMC Psychol. 2019;7(1):30.
9. Chiba R, Umeda M, Goto K, Miyamoto Y, Yamaguchi S. Factors related to recovery knowledge and attitudes among professionals in mental health in Japan. Japan J Nurs Sci. 2019;e12295.
10. Takano A, Miyamoto Y, Shinozaki T, Matsumoto T, Kawakami N. Effect of a web-based relapse prevention program on abstinence among Japanese drug users: A pilot randomized controlled trial. J Subst Abuse Treat . 2020;111:37–46.
11. Takano A, Miyamoto Y, Kawakami N, Matsumoto T, Shinozaki T, Sugimoto T. Web-based cognitive behavioral relapse prevention program with tailored feedback for people with methamphetamine and other drug use problems: Protocol for a multicenter randomized controlled trial in Japan. BMC Psychiatry. 2016;16(1).
12. Nakanishi M, Hirooka K, Imai Y, Inoue S, Yukari Y, Katayama C, et al. Dementia Care Competence among Care Professionals and Reduced Challenging Behavior of Home-Dwelling Persons with Dementia: A Pre- and Post-Intervention Data Analysis. J Alzheimer' s Dis. 2018;64(2).
13. Nakanishi M, Miyamoto Y, Nakashima T, Shindo Y, Nishida A. Care preferences of healthy, middle - aged adults in Japan and the USA if they acquired dementia: A cross - sectional observational study. Geriatr Gerontol Int. 2019;19(8):829–33.
14. Sawada K, Sakakibara E, Kanehara A, Koike H, Suga M, Fujieda Y, et al. Is Utena' s Brief Objective Measures (UBOM) useful in real-world behavioral assessment of functioning? Validity and utility testing in patients with schizophrenia. Psychiatry Clin Neurosci. 2020;74(1):40–8.
15. Iwanaga M, Miyamoto Y, Kawakami N. Use of Natural Products for Complementary Health Approaches among Psychiatric Outpatients in Japan. SOJ Psychol. 2018;5(1):1–8.

16. Chiba R, Umeda M, Goto K, Miyamoto Y, Yamaguchi S, Kawakami N. The property of the Japanese version of the Recovery Knowledge Inventory (RKI) among mental health service providers: A cross sectional study. Int J Ment Health Syst. 2017;11(1).
17. Sugino A, Sase M, Miyamoto Y. The process at which efforts to reduce seclusion and restraints are established in Japanese psychiatric wards. Seishinkakango. 2019;46(7):62–9. (in Japanese)
18. Chiba R, Umeda M, Mityamoto Y, Yamaguchi S, Goto K. What is important to support recovery in people with mental illness? A qualitative analysis of an open question among mental health service providers. Kangokagakukenkyu. 2018;16:70–8. (in Japanese)
19. Miyamoto Y, Aoyama M, Kobayashi A. Recovery college and co-production : nurses' perspective for multidisciplinary team work in the future. Psychiatry. 2020;37(2):116–21. (in Japanese)
20. Chiba R, Miyamoto Y. A new mental health service based on the educational model : Recovery College. Japanese journal of psychiatric rehabilitation. 2017;21(2):196–202. (in Japanese)
21. Miyamoto Y. Recovery : Transformation and implementation. Igakunoayumi. 2017;261(10):1015–21. (in Japanese)
22. Miyamoto Y. Peer support in other countries. In: Iwasaki K (Editor.) Disability peer support. Tokyo: Chuohoki; 2019. p. 17–28. (in Japanese)
23. Miyamoto Y, Sasaki R. Impact of peer support workers in mental health services. Journal of Japanese Association of Psychiatric Hospitals. 2017;36(10):26–32. (in Japanese)
24. Miyamoto Y, Ogawa M. co-production in UK mental health and social care policy. Seishinhokenfukushi journal Hibikiaumachide. 2019;(87):11–6. (in Japanese)
25. Miyamoto Y. Peer support and patient advocacy groups. In: Kamijima K, Watanabe M, Sakaki K (Editor). Textbook of Psychiatry for Nursing. (Rev. 5th ed.). Tokkyo: CHUGAI-IGAKUSHA; 2019. p. 257–9 (in Japanese)
26. Miyamoto Y. The expertise of peer staff. In: Oshima I, Kato S, Iwatani J, Saito T, Miyamoto Y (Editor). Tips for working as a peer support worker Tokyo: Seiwashoten; 2019. p. 24–8. (in Japanese)

Competitive Research Fundings

1. 2020 JSPS KAKENHI Grant-in-Aid for Research Activity Start-up Grant Number 20K23187. Feasibility study of Online CREW for workers' mental and physical health. PI: Utako Sawada.
2. 2020 JSPS KAKENHI Grant-in-Aid for Early-Career Scientists Grant Number 20K19087. The assessment of cognition in employment support for people with schizophrenia in Japan. PI: Akiko Inagaki.
3. 2020 Health and Labor Sciences Research Grants Comprehensive Research on Disability Health and Welfare Grant Number 20GC2201. Trauma-informed care in mental health services: research on actual situations and guideline development. PI: Daisuke Nishi, CI: Yuki Miyamoto.
4. 2019 Health and Labor Sciences Research Grants Comprehensive Research on Disability Health and Welfare Grant Number 19GC0501. Research on training the trainers and lecturers for training to develop expertise in peer support among people with disabilities. PI: Kaori Iwasaki, CI: Yuki Miyamoto.
5. 2019 JSPS Grant-in-Aid for Scientific Research (C) Grant Number 19K10923. Facilitating Co-production. PI: Yuki Miyamoto.
6. 2019 JSPS Grant-in-Aid for Scientific Research (C) Grant Number 19K02163. Developing organizational and managerial development programs to prevent mental health problems. PI: Hiroko Ohkawa, CI: Yuki Miyamoto.
7. 2019 JSPS Grant-in-Aid for Scientific Research (C) Grant Number 19K11216 Factors associated with benefit finding in families of people with mental health difficulties. PI: Rie Chiba, CI: Yuki Miyamoto.
8. 2019 JSPS Grant-in-Aid for Scientific Research (B) Grant Number 19H03941. Establishment of Health Quality & Outcome Research for Diversity of Families. PI: Kiyoko Kamibeppu, CI: Yuki Miyamoto.
9. 2018 JSPS Grant-in-Aid for Scientific Research (B) Grant Number 18H03069. A case study research method for developing knowledge of expert care practices. PI: Noriko Yamamoto, CI: Yuki Miyamoto.
10. 2017 JSPS Grant-in-Aid for Scientific Research (C) Grant Number 17K12474. Development of an educational program incorporating the perspective of community-based comprehensive care in a child and adolescent psychiatric ward. PI: Akiko Funakoshi, CI: Yuki Miyamoto.
11. 2016 Health and Labor Sciences Research Grants Comprehensive Research on Disability Health and Welfare Grant Number H28-Shintai Chiteki-General-002. Research on training to develop expertise in peer support among people with disabilities. PI: Kaori Iwasaki, CI: Yuki Miyamoto.
12. 2016 Grant-in-Aid for Challenging Exploratory Research Grant Number 16K13438. Development of a training program for young employment support practitioners focusing on managing occupational stress. PI: Hiroko Ohkawa, CI: Yuki Miyamoto.
13. 2016 AMED-CREST, AMED Research and Development Grants for Comprehensive Research for Persons with Disabilities Grant Number 16dk0307066h0001. Development of recovery college operation guidelines: Co-production and co-delivery by a multi-professional team including people with lived experiences. PI: Yuki Miyamoto.

Division of Nursing Systems

Department of
Care Quality Management

Care Quality Management for Older People Study Group

Professor, Noriko Yamamoto-Mitani *PhD, RN* April 2012–Present

Project Professor, Lai Lam Yuk Claudia *PhD, RN* January 2017–October 2017
Current: Hong Kong Polytechnic University, Professor

Associate Professor, Ayumi Igarashi *PhD, RN* April 2013–Present

Maiko Noguchi-Watanabe *PhD, RN* April 2015–Present

Mariko Sakka *PhD, RN* May 2018–Present

Project Assistant Professor, Chie Fukui *PhD, RN* April 2020–Present

Post-doctoral researcher, Sameh Ali Mohamed Eltaybani *PhD* April 2020–Present

Assistant Professor, Naoko Mikoshiba *PhD, RN* April 2016–March 2018

Reiko Yamahana *PhD, RN* April 2014–March 2018
Current: Tokyo Healthcare University, Lecturer

Post-doctoral researcher, Zhang Fengying *PhD, RN* April 2018–January 2019
Current: Sichuan University, Professor

Aims and Achievements

We study care quality assurance and continuous quality improvement systems. Specifically, we work on four topics: “Development of quality benchmarks” [1,2,3], “Support for care workers,” “Care exploration based on experiences,” and “Care quality Assurance of community care system.”

Regarding the development of quality benchmarks, we developed quality indicators that could evaluate the quality of care. The first step in the development benchmarking of quality indicators was to develop indicators to assess the quality of long-term care. First, we developed quality indicator items that could be assessed from ward management data and questionnaire surveys. Next, to assess outcomes from individual patient data, we examined quality indicators that could be collected from medical records. We showed the usefulness of these quality indicators as being derived from pre-existing data. We also confirmed that evaluating outcomes from more diverse perspectives is needed. We developed new quality indicators that comprehensively evaluate the quality of long-term care and conducted a longitudinal survey of homecare users using these indicators. The findings showed that using home nursing services could lead to favorable outcomes.

In the care exploration based on experiences, we have been working on the development of a case study method for finding the meaning of care in order to clarify the knowledge of practice brought from the nursing field and to establish a new form of case studies [4]. In this project, four research papers were published, and several case studies of nursing practice were conducted in the field. To disseminate the case study method, 14 case study seminars were held with a total of 681 participants. We have held 12 case study lectures and exchange meetings at various academic conferences, and the exploration of care using this case study method is progressing in a variety of fields.

In the area of quality assurance in community care systems, we examined methodologies for building community-based comprehensive care systems in collaboration with private businesses. Convenience stores play an important role in supporting the elderly in the community as private businesses [5]. We created a system for effective collaboration with the regional comprehensive support center and showed the effect of promoting support for the elderly in convenience stores. We used the community-based participatory research (CBPR) method to develop gaming tools and newsletters to build relationships. These activities were developed as a joint research project with the local government, and this research is still ongoing.

The results of these activities were published in academic journals as 24 English papers and 34 Japanese papers. The results were also reported at international (21 papers) and domestic (27 papers) conferences.

Contribution to Division of Nursing Systems

Due to the multifaceted nature of nursing care, care visualization and quantitative assessment of care quality is difficult. Therefore, we attempted to develop and implement a framework for care assessment and quality evaluation.

First, we examined quality indicators that could be collected from existing data, such as ward management data and medical records. As a result, we showed the usefulness of quality indicators that can be collected from existing data. At the same time, we confirmed the necessity of outcome assessment with more diverse aspects. Therefore, we worked on developing quality indicators that can comprehensively assess the quality of long-term care. The new care quality indicators were developed as follows. First, outcome indicators for 24 items across eight domains were developed by nursing researchers following Gordon’s framework of functional health patterns. Next, evaluation indicators for visualizing the content of care practices were developed separately for assessment and care. The framework of the quality indicators (domains, outcome indicators, and process indicators)

was then refined by an expert panel of researchers and practitioners from various professions. As a result, quality indicators consisting of care outcome and process indicators were answered by care providers, and quality of life was assessed by the elderly themselves or their families [6].

The developed indicators were then used to verify the effects of nursing interventions on older people who require care. With the cooperation of nursing home agencies and in-home nursing care support agencies nationwide, a one-year prospective survey was implemented to capture the condition of elderly patients living at home and the content of home nursing practice on a patient-by-patient basis [7]. This survey covers more than 1,000 elderly patients living at home and is the first large-scale study in Japan to show the effects of nursing care.

This studies results are expected to directly lead to innovations in care that will improve the quality of care for elderly patients living at home and eventually to the realization of desirable standardized care. In the future, we will continue to study nursing care for older people undergoing treatment at home and those residing in facilities.

Link to the Mission of GNRC

We aim to build a system for quality assurance and continuous care quality improvement (care worker and nurse care). In the expert panel for the development of the quality of care index, we tried to integrate different disciplines by having researchers and practitioners from various fields participate in the panel, rather than just nursing researchers. Along with this, when constructing the system, we collaborated with nursing researchers and engineering researchers to construct the system, aiming for innovative nursing research.

Furthermore, we used the developed quality indicators to study the effects of care (nursing and nursing care). The results were presented at many academic conferences, both in Japan and abroad, and submitted to academic journals to disseminate our achievements to researchers and graduate students in nursing and related fields.

We believe that these efforts will serve as a foundation for the future development of care quality management research.

Future Directions

Over the past four years, the care quality management research at GNRC has made significant progress in its initial goals of assuring the quality of care (Care worker and nurse care) and building a continuous quality improvement system. In the future, we would like to further develop the construction of the quality improvement system by refining the quality indicators we have developed and establish new data collection methods using text mining.

Over the past four years, we have also invited five overseas researchers, expanding our network beyond Japan to other countries. In the future, we would like to expand this network further and make it a standard for desirable nursing practices and the improvement of nursing quality.

References

1. Eltaybani S, Noguchi-Watanabe M, Igarashi A, Saito Y, Yamamoto-Mitani N. Factors related to intention to stay in the current workplace among long-term care nurses: A nationwide survey. Int J Nurs Stud. 2018 Apr;80:118-27.
2. Saito S, Igarashi A, Noguchi-Watanabe M, Takai Y, Yamamoto-Mitani N. Work values and their association with burnout/work engagement among nurses in long-term care hospitals. J Nurs Manag. 2018 May;26(4):393-402.
3. Yamamoto-Mitani N, Saito Y, Futami A, Takaoka M, Igarashi A. Staff nurses' evaluation of care process quality and patient outcomes as quality indicators in long-term care hospitals: A cross-sectional questionnaire survey. Int J Older People Nurs. 2020 Jul 20;e12334.
4. Igarashi A, Matsumoto H, Takaoka M, Kugai H, Suzuki M, Yamamoto-Mitani N. Educational Program for Promoting Collaboration Between Community Care Professionals and Convenience Stores. J Appl Gerontol. 2020 Jul;39(7):760-9.
5. Kitamura S, Igarashi A, Inagaki A, Takaoka M, Noguchi-Watanabe M, Sakka M, et al. A New Approach to Develop Gerontological Nursing Care Quality Indicators, GSA 2019 Annual Scientific Meeting, November 13-17, 2019. 11 Austin, USA.
6. Fukui C, Igarashi A, Noguchi-Watanabe M, Sakka M, Naruse T, Kitamura S, et al. Development of Quality Indicators for Evaluating the Quality of Long-term Care. Geriatr Gerontol Int 2021 Feb, Forthcoming.
7. Yamamoto-Mitani N, Ikeda M, Ietaka H, Noguchi-Watanabe M, Yamahana R. Issue of Knowledge Sharing in Qualitative Case Studies. The 15th International Congress of Qualitative Inquiry. May 15-18, 2019. Urbana-champaign, USA.

Competitive Research Fundings

1. 2020 Grant-in-Aid for promoting health services for the elderly. Verification of the effect of nursing intervention for older people requiring long-term care. (PI: Noriko Yamamoto-Mitani)
2. 2019 Grant-in-Aid for promoting health services for the elderly. Verification of the effect of nursing intervention on older people requiring long-term care. (PI: Noriko Yamamoto-Mitani)
3. 2019 Research Grant from the Policy Medical Promotion Foundation, 2019. Examination of factors related to unplanned hospitalization in home caregivers with non-cancer disorders: a case-control study. (PI: Hiromi Kobayashi , CI: Maiko Noguchi-Watanabe, Takashi Naruse, Mahiro Fujisaki)
4. 2018 Sompo Japan Nipponkoa Welfare Foundation Gerontology Research Grant. Effects of training programs to promote collaboration with convenience stores in support of local elderly people. (PI: Ayumi Igarashi , CI: Noriko Yamamoto-Mitani, Miho Suzuki, Manami Takaoka)
5. 2018 Grant-in-Aid for Scientific Research (Grants-in-Aid for Academic Research) Challenging Research (Budding). Development of Long-term care outcome quality index: Construction of facility and home cross-sectional index. (PI: Ayumi Igarashi; CI: Sakiko Fukui, Sumie Ikezaki, Masayo Kashiwagi, Noriko Yamamoto-Mitani, Takashi Naruse)
6. 2018 Grant-in-Aid for Scientific Research (Grant-in-Aid for Scientific Research) Basic Research B. Establishment of a method of “case study that enables the propagation and succession of outstanding care.” (PI: Noriko Yamamoto-Mitani; CI: Chiyoe Sakamoto, Yuki Miyamoto, Nami Saito, Tetsuya Sakakibara, Koji Ishihara, Daisuke Son, Reiko Yamahana, Maiko Noguchi-Watanabe, Yuki Mochizuki, Mari Ikeda, Nami Saito, Kiyomi Karasawa, Shigeko Yoshida).
7. 2017 Pfizer Health Research Foundation Research Grant. Construction of long-term medical treatment hospital bed improvement system: Quality index development and intervention in staff QOL (PI: Noriko Yamamoto-Mitani; CI: Ayumi Igarashi, Ikuko Sakai, Akihito Shimazu, Hiroki Fukahori, Yumiko Saito, Manami Takaoka)
8. 2017 Nippon Life Foundation Grant for Practical Research on Young People in Aging Society. Development of educational programs using case study meetings for employees of long-term medical care facilities. (PI: Yumiko Saito; CI: Ayumi Igarashi)

Division of Nursing Systems

Department of Care Quality Management

Care Quality Management for Patients and Nurses Study Group

Associate Professor, Yukie Takemura *PhD, RN, PHN* April 2017–Present

Assistant Professor, Naoko Ichikawa *PhD, RN, PHN* April 2017–Present

Ryohoei Kida *MNS, RN* May 2018–Present

Specially Appointed Assistant Professor, Hiroe Koyanagi *MHS, RN* April 2020–Present

Senior Assistant Professor, Kimie Takehara *PhD, RN, PHN* April 2017–March 2018
Current: Nagoya University, Associate Professor

Assistant Professor, Keiko Kunie *PhD, RN, PHN* Apr 2017–Mar 2020
Current: Tokyo Women's Medical University, Senior Assistant Professor

Aims and Achievements

The care quality management field focuses on the structure and process of care provision and aims to help patients, residents, nurses, professionals and various organizations. We have been conducting research activities with the goal of elucidating organizational phenomena that bring out the power in the nurses delivering care.

In our group, to contribute to the construction of a safe and high-quality nursing provision system, our goal is to elucidate complex organizational phenomena from various angles and search for the key (leverage) that promotes organizational change. Our main research aims are to identify work environments that bring out the abilities of the nursing staff, develop organization management methods in bed reorganization and crisis situations, and establish organization analysis methods that can be clinically applied by revealing complex organizational phenomena. So far, we have conducted research mainly for nursing staff and intervention research for nursing managers. We have also been conducting research activities related to nursing organization management from various perspectives. These achievements were published in academic journals as 14 English papers and 14 Japanese papers, and were reported at international conferences (16 reports) and national conferences (63 reports), some of which were highly evaluated (Awarded 5 times).

Contribution to Division of Nursing Systems

To provide safe and high-quality nursing, it is necessary to manage an organization in which nurses can continue to work while demonstrating their abilities. An organization is not just an individual group but changes based on having employees with various abilities, experiences, and personalities, the supervisors, and the work environment. Therefore, in addition to clarifying organizational phenomena from various angles using existing quantitative and qualitative research methods, we are also developing new research methods for understanding complex organizational phenomena.

In the development of the organization analysis methodology line research was done on the organizational management in the nursing workplace after the Fukushima nuclear power plant accident happened. Nursing administrators of the hospital, which continue to operate in the evacuation area adjacent to Fukushima Prefecture after the Great East Japan Earthquake, nursing staff in various positions, such as continuing employees and temporary evacuees, all make various decisions in each phase for several years immediately after the disaster. Through research, the way that individuals reach at the workplace, experience of nursing staff, and the long-term impact on the nursing staff was clarified (October 2018 / March 2019 presentation at international conference). Furthermore, in the course of the study, we were able to illustrate workplace phenomena that exist beyond just a single organization. We did this by using the "multiple organization case study approach" which consider the narrative of the individual's diverse position in multiple organizations (Presentation at the conference in December 2017, information exchange in August 2019).

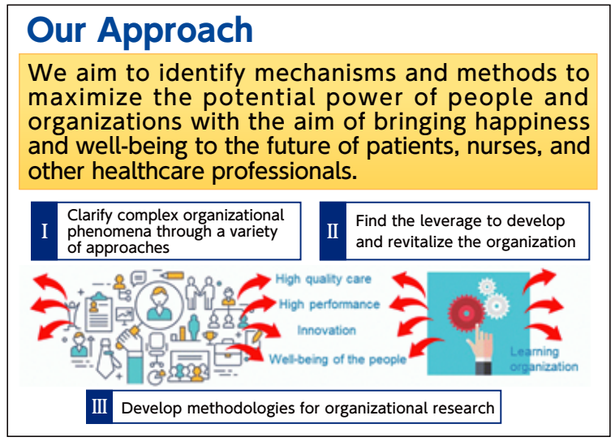


Figure 1: The vision of our group

Nursing organization management tends to be limited to one-off practice reports because they are highly context-dependent and it is difficult to control various factors, but the multiple organization case study approach extracts commonalities across organizations and generates a theory with a high transferability.It is expected that this method will lead to the development of nursingmanagement science.

To unravel the key (leverage) in facilitating organizational change, we have developed a list of work environment elements that a nurse experience. For example, the relationship between the work value of part-time nursing staff and job satisfaction [1], the experience pattern and characteristics of nursing staff during ward reorganization [2], the relationship between the role recognition and information sharing behavior of nursing assistants and nurses [3], nurse managers' vision to lead the organization for the better [4], and so on. In addition, the nursing department managers of small and medium-sized hospitals with less than 200 beds find it difficult to organize the nursing department and maintain the quality of nursing compared to the nursing department managers of hospitals with 200 beds or more, and the burnout score is high. It was found that the environment of the small hospital had low organizational fairness and structural empowerment [5]. In order to support one of the keys (leverage), "organization management (mission management)", as external support to improve the management of nursing organizations in small and medium-sized hospitals, we have been developing a protocol for outreach support in cooperation with Tokyo Nurse Plaza since 2016. The results were reported at academic conferences by researchers at The University of Tokyo, the staff at the Tokyo Nurse Plaza, and nursing managers at hospitals that have received support.

Furthermore, using the competency model of nursing managers developed by Takemura (2014), we are developing a capacity development program for the nurse managers. To support the nurse managers who are in charge of operating each department, we are also conducting effect evaluation research in an attempt to change the management practice of managers by three-layer reflection using a competency model. In addition, while making the most of our expertise, we are in charge of part of the Tokyo Nurse Plaza training for newly appointed nursing managers such as small and medium-sized hospitals, home-visit nursing stations, nursing facilities, and shares on-site issues. We are also working to build new relationships between the nursing field and researchers, such as by providing support for solutions to managers' clinical problems.

These achievements will contribute to the management of nursing organizations, which is important for supporting the provision of safe and high-quality nursing and continuously advancing nursing technology.

Link to the Mission of GNRC

In the department of nursing management, we aim to establish new nursing management science, including the development of organization analysis methods specialized for nursing organizations. The shortage of nurses has become a problem not only in Japan but also internationally, and the knowledge of creating a system that effectively demonstrates the power of nurses and provides high-quality care while maintaining well-being is thus very important internationally. In our department, we will incorporate the knowledge and research methods of business administration, pedagogy, and sociology, and apply these concepts to clinical settings. While doing this, we put an emphasis on deeply understanding organizations as a whole while also being aware of how these concepts would apply to the clinical settings. We have been working on fusion with other disciplines, the creation of new research methods and intervention methods, dissemination both domestically and internationally, and ways to give back to the clinical settings. In this way, we have established the foundation of a new field of nursing management, and have promoted the construction of academic systems and educational systems.

Future Directions

For the past four years, research on nursing systems in this field, especially on nursing organization management, has been conducted to accurately depict complex organizational phenomena and elucidated the key (leverage) components for organizational change in clinical practice. These activities have provided a great deal of knowledge for managing nursing organizations in clinical practice and we have even attempted to implement some of them. However, further research is needed for the development and clinical implementation of methods that stimulate components that promote organizational change.

So far, we have conducted organizational studies using questionnaires and interviews in this field, but simply analyzing and clarifying organizational phenomena does not necessarily improve the organization. In the future, we will systematize knowledge about organizational management methods, ideals, and social environment that will bring out the power of people and organizations and deliver high-quality healthcare to society. In addition to building nursing management science, we would like to work on building a system that makes use of our knowledge in the field. We aim to uncover new concepts in nursing management science and integrate them with clinical field activities such as outreach support. We would like to contribute to the realization of a society in which high-quality care is provided to patients by effectively maintaining creative activities and the sustainability of the organization.

References

1. Komagata M, Takemura Y, Ichikawa N, Takehara K, & Kunie K. Quality of work among part-time nurses and its relationship to job satisfaction and work values: A cross-sectional study. Nursing and Health Sciences. 2020;1-12.
2. Funakoshi C, Kunie K, Takemura Y, Ichikawa N. Classifying Nurses Based on Hospital Organizational Change Experience and Investigating the Characteristics of such Classification: A Cluster Analysis Approach. Journal of the Japan Academy of Nursing Administration and Policies. (in press)[In Japanese]
3. Saiki M, Kunie K, Takemura Y, Takehara K. & Ichikawa N. The relationship between nurses' perceptions of nursing assistant roles and information-sharing behaviors: A cross-sectional study. Nursing and Health Sciences, 2020;22:706-13.
4. Isobe T, Kunie K, Takemura Y, Takehara K, Ichikawa N, Ikeda M. Frontline nurse managers' visions for their units: A qualitative study. Journal of Nursing Management. 2020;28:1053-61.
5. Takemura Y, Kunie K, Ichikawa N. The effect of work environment on burnout among nurse directors: a cross sectional study. Journal of Nursing Management, 2020;28:157-66.

Awards

1. Best Oral Award. 2019. 23th The Japan Academy of Nursing Administration and Policies Conference. Impact of intermediary nurses on department to promote mutual understanding between staffs and supervisor: Relationship with trust in supervisor. Yuta Nagasaka, Naoko Ichikawa, Yukie Takemura, Keiko Kunie, Ryohei Kida.
2. Best Oral Award. 2018. 56th Japan Society and Healthcare Administrations Conference. The relationship between job characteristics and work assignment on part-time nurses in general units. Marie Komagata, Yukie Takemura, Naoko Ichikawa, Kimie Takehara, Keiko Kunie.
3. Best Poster Award. 2018. 46th Global Nursing and Healthcare. Separation at workplace after the nuclear accident due to The Great East Japan Earthquake: Is the classification for dividing hospital nurses accurate? Keiko Kunie, Yoshie Takahashi, Yukie Takemura.
4. Best Poster Award. 22th The Japan Academy of Nursing Administration and Policies. Nurses' workplace stress, support, and working conditions after return to work: Results by classification according to changes in motivation to work after participating in the reinstatement support project. Keiko Ishii, Takamasa Kai, Naoko Ichikawa, Yukie Takemura, Masatoshi Saiki, Marie Komagata, Yaiko Miyamoto, Masayo Suzuki, Mitsuyo Soma.
5. Best Oral Award. 21th The Japan Academy of Nursing Administration and Policies. Nurse managers' Vision: The image of their department that they want to realize in the next few years extracted from narrative data. Tamaki Isobe, Yukie Takemura, Kimie Takehara, Kazunori Komagata, Naoko Ichikawa, Mari Ikeda, Chieko Komiyama, Mitsuyo Soma.

Competitive Research Fundings

1. 2020 Health and Labor Sciences Research Grants. Grant Number 20CA2029. Survey on securing nursing staff and organizational management during the COVID-19 pandemic. PI: Yukie Takemura, CI: Naoko Ichikawa, Ryohei Kida, Hiroe Koyanagi
2. 2020 JSPS KAKENHI Fundamental Research Grant (C). Grant Number 20K10680. Development of new turnover index by comprehensive evaluation: Verification of validity and practicality as nursing management index. PI: Yukie Takemura.
3. 2019 First Star joint research. Research on employability and competency for nurses. PI: Yukie Takemura, CI: Tamaki Isobe.
4. 2019 Health and Labor Sciences Research Grants. Grant Number 19IA2017.Research for improving the working environment and working hour of nurses. PI: Yukie Takemura, CI: Ryohei Kida.
5. 2018 The Mitsubishi Foundation Research Aid. Grant Number 30201. Evaluation of nurse managers' competency development program by 3-layers reflection referring to competency model. PI: Yukie Takemura
6. 2018 Health and Labor Sciences Research Grants. Grant Number H30-Special Research-012. Survey on nurses and medical institutions to secure nursing staff. PI: Yukie Takemura, CI: Keiko Kunie, Naoko Ichikawa, Ryohei Kida
7. 2020 The Health Care Science Institute Research Aid. Research on the person-environment fit of hospital nurses who experienced workplace transfer. PI: Sakiko Nagaoka
8. 2020 SASAKAWA Health Foundation Research Aid. Verification of the effectiveness of educational programs that share role awareness and deepen understanding among occupations. PI: Saiki Masatoshi
9. 2020 The Japan Academy of Nursing Administration and Policies Research Aid. Nurses' employability on workplace transfer: Differences by facility type of important elements s in hiring. PI: Tamaki Isobe
10. 2019 Policy-based medical services foundation Research Aid. Longitudinal study for identifying effective supports for the person-environment fit of hospital nurses. PI: Maho Inoue.
11. 2019 GUSHINKAI Foundation Research Aid. Verification of the relationship between the workplace social capital and psychological health, intention to stay, quality of nursing care. PI: Ryohei Kida
12. 2018 The Japan Academy of Nursing Administration and Policies Research Aid. Identification of competency of outreach support providers for small and middle hospital, and outreach support outcomes. PI: Keiko Kunie
13. 2017 The Health Care Science Institute Research Aid. The association between work assignment and job characteristics, work value, performance outcomes on part-time nurses. PI: Komagata (Kakoi) Marie.
14. 2017 JSPS KAKENHI Grant-in-Aid for Young Scientists (B). Grant Number 17K17394. Nurses' economic, social, and organizational value recognition: Building a 3D shared value expansion model. PI: Keiko Kunie.
15. 2017 JSPS KAKENHI Grant-in-Aid for Young Scientists. Grant Number 17K17395. Development of professionalism development program for nurses. PI: Naoko Ichikawa.

Division of Nursing Systems

Department of
Care Quality Management

Care Quality Management for Community Study Group

Professor, Noriko Yamamoto-Mitani (Concurrent) *PhD, RN, PHN* April 2018–Present
Senior Assistant Professor, Takashi Naruse *PhD, RN, PHN* April 2012–Present
Assistant Professor, Chie Teramoto *PhD, RN, PHN* April 2017–March 2020
Curremt: Hiroshima University, Senior Assistant Professor
Riho Iwasaki *PhD, RN, PHN* September 2017–Present
Chikako Honda *PhD, RN, PHN* April 2019–Present
Project Assistant Professor, Yuka Sumikawa *PhD, RN, PHN* April 2020–Present

Aims and Achievements

Community nursing is a discipline that aims to contribute towards the improvement of people's quality of life and the development of healthy and safe communities to support it. Based on community nursing, this research group aimed to explore effective nursing care for people living in various settings and with different health levels, taking a continuous and comprehensive view of their lives, and working with people and communities. We have conducted research on care providers and stakeholders, focusing on local public health centers and home care service agencies, which are important modules of the community-based comprehensive care system.

Our research activities have used community based participatory research (CBPR), a research method that adopts collaboration with people and communities. In this way, we have tried to simultaneously promote understanding of phenomena and social change. Specifically, the following four activities are carried out in the community and in which the researcher is involved: (1) solving the problem, (2) promoting the community members' competency to solve their problem, (3) improve learning, perception, and behavior of the community members directly involved in the research, and (4) developing the social resources necessary for the community. These four activities are incorporated into our research. We believe that this approach is the key for nursing science to influence social change in the future.

The Institute of Medicine, an affiliation of the U.S. National Academy of Sciences, has identified CBPR as one of the eight areas necessary for the education of public health professionals in the 21st century, and it has attracted great international attention. However, the history of CBPR is still in the making, and many aspects of its methodology and significance remain unknown. Furthermore, it is a field where it is difficult to show tangible and rapid results. Our mission has been to train the members of this research group to become familiar with the CBPR methodology, to experience and communicate its significance, and to develop human resources who can do so. To date, we have received seven competitive grants for research in collaboration with practice.

Contribution to Division of Nursing Systems

This group has been developing an educational course (master's course) to obtain a national certification of “Public Health Nurse” , who is a practitioner in community health care settings. This educational course and the research based on CBPR have been developed in continuous partnership with each other. Public health nurses have the same national qualifications as nurses and midwives. With this educational course, we offer a practicum in collaborative research activities with the community. In this course, students evaluated the activities in maternal and child, mental, adult, and elderly health, conducted by public health centers in urban areas, as well as on-time analysis and shared the response of government agencies to the new coronavirus infection. The results of these activities were shared with public health centers and related parties and informed subsequent projects and measures. These activities have contributed both to the development of human resources who will become CBPR practitioners and to an increase in CBPR case studies.

Link to the Mission of GNRC

In 2020, as a result of the spread of the new coronavirus, public health centers, which are collaborative partners, were short on critical public health personnel and on personnel responspible for managing and analyzing the daily accumulation of infection-related data. In response to the public health center's request, we immediately set up a system to fill the above-mentioned personnel and provided practical support with the cooperation of other groups. We also reported this critical situation to international journals[1,2] and have continued to collaborate with them to solve problems that meet the needs of the field.

We have a collaborative relationship not only with health centers, but also with hospitals and nursing care providers. For more than four years, we have been conducting collaborative research with managers and staff of local day-care centers to evaluate and

improve nursing care [3, 4]. Examples of collaborative research are presented in Figures 1 and 2. Figure 1 shows the infant safety educational program for pregnant mothers that was developed in collaboration with practitioners. Figure 2 shows a logic model of a nursing care service developed in collaboration with a nursing home.

In this way, we have established collaboration with practitioners in a variety of settings and challenged ourselves to foster a research team, thereby preparing the ground for nursing science and practice to learn and develop together. So far, we have had visitors from Whitman College (United States), the University of Queensland (Australia), Sichuan University (China), and others, and some studies have been performed through collaboration.

.

Figure 1: Infanct safety education program

(Left) Movie watching a simulation video
(Right) Demonstration of a fall from a baby carrier

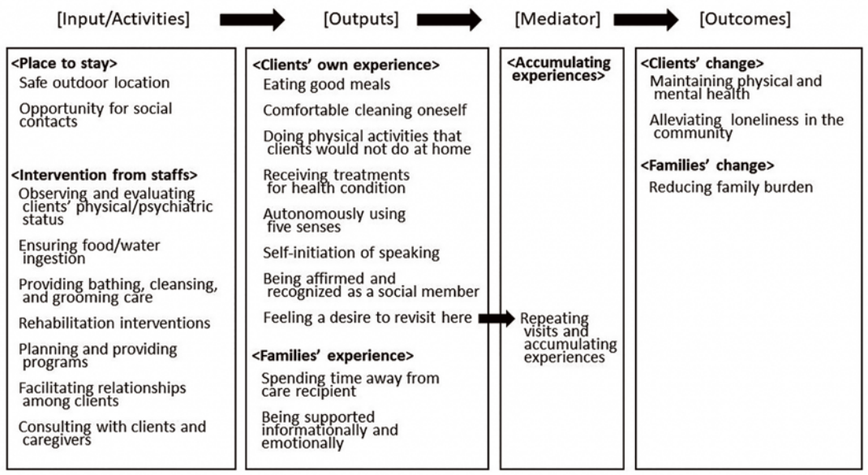


Figure 2: Logic model of day-care service [3]

Based on the model, we also developed measurement of the care process quality [4]

Future Directions

For a long period of time, we have achieved the development of many practitioners in community and public health nursing and the establishment of collaborative relationships with related parties who will conduct research with us at CBPR. In the future, based on these collaborative links, we will focus on creating an organization in which ongoing research and practice can interact and develop together, and with other activities to achieve this. In this way, we hope to clarify the CBPR methodology, which is still largely unknown, and to promote current health promotion activities with our collaborative partners in the community. We believe that these models of organization and activities will contribute to clarifying the value of CBPR in eliminating the gap between research/studies and practice, and to demonstrating the state of the discipline to improve nursing practice.

References

1. Honda C, Yoshioka-Maeda K, Iwasaki-Motegi R. Child Abuse and Neglect Prevention by Public Health Nurses during the COVID-19 Pandemic in Japan. J Adv Nurs. 2020 ; 76(11) : 2792-3.
2. Yoshioka-Maeda K, Iwasaki-Motegi R, Honda C. Preventing the dysfunction of public health centers responding to COVID - 19 by focusing on public health nurses in Japan. J Adv Nurs. 2020 ; 76(9) : 2215-6.
3. Naruse T, Kitano A, Matsumoto H, Nagata S. A logic model for evaluation and planning in an Adult Day Care for disabled Japanese old people. Int J Environ Res Public Health. 2020 ; 17(6) : 2061
4. Naruse T, Tuckett AG, Matsumoto H, Yamamoto-Mitani N. Measurement Development for Japanese Clients' Experiences During Adult Day Care Service Use (The J-AdaCa Tool). Healthcare. 2020; 8(4) : 363.

Competitive Research Fundings

1. 2020, JSPS KAKENHI Grant-in-Aid for Scientific Research (B), 20H04009. Development and evaluation of guidelines for environmental improvement and intervention in Adult day care service, using JBI method. PI: Takashi Naruse, CI: Noriko Yamamoto-Mitani.
2. 2020, JSPS KAKENHI Grant-in-Aid for Research Activity Start-up, 20K23188. Development of a new transitional care model to prevent rehospitalization (PHR-TC): understanding the current situation and examining the effectiveness. PI: Yuka Sumikawa.
3. 2019, JSPS KAKENHI Grant-in-Aid for Research Activity Start-up, 19K24223. Development and effectiveness of collaborative group education program for pregnancy and community to create safety for infants. PI: Chikako Honda.
4. 2017, JSPS KAKENHI Grant-in-Aid for Young Scientists (B), 17K17536. Exploring a new marketing methodology for Adult day care services in a comprehensive community care system. PI: Takashi Naruse.
5. 2017, JSPS KAKENHI Grant-in-Aid for Young Scientists (B), 40760286. Development and verification of a new education model for the training of small municipal public health nurses in a declining population society. PI: Riho Iwasaki.
6. 2017, JSPS KAKENHI Grant-in-Aid for Research Activity Start-up, 17H06650. Actual conditions of emergency consultations among patients using home visit medical care and examination of a program to prevent re-visits to emergency department. PI: Chie Teramoto.
7. 2014, JSPS KAKENHI Grant-in-Aid for Young Scientists (A), 26713059. Evaluation of the effect of teamwork between home visit nurses and other professionals. PI: Takashi Naruse.