

# SGH NURSING RESEARCH & INNOVATION- 2022 YEAR IN-REVIEW

## GRANTS AWARDED

### INNOVATION GRANTS

- **SingHealth Duke-Nus Academic Medical Centre (AMC) Academic Medicine Innovation Institute (AMII) Adoption Grant (\$42,000)**  
Nimble IV Cannulation Game for Training & Assessment- SNM Andrea Choh Chau Lin
- **SGH Innovation Grant (\$50,000)**  
Optimising a Bedside Activity Device for Hospitalised Older Adults -ANC Darshini Devi Rajasegaran

### OTHER GRANTS

- **SGH Health Development Fund (\$10,000)**  
To develop a patient education application in the community- DDN (APN) Lim Su Fee
- **SGH Health Development Fund (\$9,3332.54)**  
Development of a supervised machine learning algorithm to predict risk of pressure injury among hospitalized adults- NC Nanthakumahrie Gunasegaran

2 publications-  
Local Journals

17 publications-  
International  
Journals

21 Studies in-  
progress

## RESEARCH & INNOVATION FOCUS AREAS



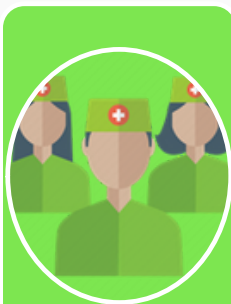
**Nursing Care  
Outcomes**  
Page 3

- Data driven risk algorithms to inform care



**Nursing  
Surveillance**  
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- Safety, adequacy, innovations, predictability



**Nursing  
Workforce**  
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- Future ready nursing workforce



**Care  
Transformation  
& Innovation**  
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- Feasibility trial
- Cost effectiveness



**Caregiver well-  
being,  
Education &  
Coping**  
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- Health/digital literacy and activation



**Evidence- Based  
Nursing &  
Publications**  
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- Latest updates and guidelines

# SGH to deploy AI-powered tool to ensure proper wearing of PPE

It can detect right and wrong movement during gown donning and doffing

Chong Xia Wei

A new digital tool to ensure healthcare workers and visitors entering high risk wards are wearing their personal protective equipment (PPE) properly will be deployed at Singapore General Hospital (SGH) within the next two months. The first of its kind here, the tool, called Blue Mirror PPE InSTRUCTOR, is powered by artificial intelligence. In 2020, Ms Ang Shin Yuh, deputy director of the nursing division at SGH, suggested the idea of using technology to ensure that PPE is worn properly. At the time, nurses were de-



Assistant nurse clinician Darshini Deel Rajasegaran demonstrating the train and practice mode of the Blue Mirror PPE InSTRUCTOR. The digital tool will be deployed in an isolation ward, a multi-drip-resistant organoid ward that allows visits and the training department at Singapore General Hospital. ST PHOTO: LIM YONG

can practice at any time without the need for a human trainer. Visitors will learn to wear the PPE at a pace slower than that for the training mode and can refer to tutorial guides, the tool will alert staff and visitors if they are wearing equipment such as gloves and gowns incorrectly. It can also track healthcare workers' compliance case-specific protocol, contact tracing purposes and image recognition for staff access in the future. "This will put us in the best possible position when the next pat-

(Left) "SGH to deploy AI-powered tool to ensure proper wearing of PPE" featured in Straits Times pB5 on 16/07/2022.

Study Team: **DDN Ang Shin Yuh, ADN Lee Lai Chee, SNM Fazila Aloweni, NC Esther Monica, NC Bushra Shaik Ismail, Mr Daniel Lim Yan Zheng, Ms Lim Shu Hui, Ms Hui Soh Mei, Ms Raden Nurheryany**

## RESEARCH/ INNOVATION AWARDS

- SingHealth Duke-NUS Research Appreciation Awards 2022- Yoda Grant Master Award [**SNM Fazila Aloweni**]
- SingHealth Nursing Research and Innovation Day- Enhancing a drip rate reader to accurately measures rates of intravenous fluids (3rd Prize) [**ANC Tan Sheng Lian**]

## NURSING AWARDS

- SingHealth Nursing Awards 2022- Nursing Innovator Award [**SNM Andrea Choh Chau Lin**]
- SingHealth Nursing Awards 2022-Best Nurse Publication of the Year [**NC Fan Peijin Esther Monica**]

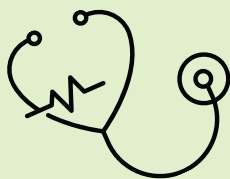


## SHM CONFERENCE AWARD

- Singapore Healthcare Management 2022- Efficacy of an autonomous commode to improve productivity for healthcare providers and enhance safety for patients and healthcare providers in a National Cancer Centre Singapore - Poster Award Patient Experience Category [**Site-PI SNM Fazila Aloweni**]

## SGH 24TH ASM CONFERENCE AWARDS

- Artificial Intelligence-Augmented Smart Mirror to Ensure Proper Donning and Doffing of Personal Protective Equipment (PPE) - Best Poster Award- Nursing [**SNM Fazila Aloweni**]
- Examining the effectiveness of a hydrocolloid crusting method versus standard barrier cream in the treatment of incontinence-associated dermatitis among adult patients in an acute setting - Outstanding Research Award (Nursing) [**NC Nanthakumahrie Gunasegaran**]
- Lived experiences of adolescents and young adults (AYA) with newly-diagnosed acute leukemia undergoing chemotherapy in Singapore: An Exploratory Study - Young Investigator's Award (Nursing) [**SN Cheryl Tay**]



# NURSING CARE OUTCOMES

**Key Project: Deep tissue injuries among hospitalized patients: An explorative audit study**

**1**

**Aims:** (1) To study the accuracy of deep tissue injury assessment done by nurses through auditing the nursing care record; (2) To classify the types of error associated with the inaccurate pressure injury assessment

**Project team members:** Ms Nanthakumahrie Gunasegaran, Ms Chong Hui Ru, Ms Fazila Aloweni

**Key Project: Evaluation of nurse reported missed care in a Post-anaesthesia Care Unit: A mixed-methods study**

**2**

**Aims:** (1) Evaluate the frequency, types and perceived reasons for NRMC in the PACU setting (2) Evaluate associations between nurse demographic and workload factors (such as staffing levels and fluctuations in patient volume, acuity and activity), with NRMC; and (3) Explore nurses' perception on type of care provided, facilitators and barriers in providing patient care, and types of NRMC in the PACU setting.

**Project team members:** Ms Laura Heng Mun Tze, Dr Lim Siew Hoon, Ms Darshini Devi Rajasegeran, Ms Yang Jumei



**Key Project: Hypoglycaemia management post hyperkalaemia treatment with insulin in an acute care tertiary hospital-a quality improvement project**

**3**

**Aims:** (1) To determine incidence of hypoglycaemia in adult patients treated for hyperkalaemia with insulin at an acute care hospital; (2) To evaluate associating factors related to the development of hypoglycaemia in adult patients treated for hyperkalaemia with insulin.

**Project team members:** Dr Lim Siew Hoon, Dr Teh Ming Ming (Dept of Endocrinology), Ms Tan Kai Hui Co-I (Dept of Pharmacy), Ms Fazila Aloweni, Ms Ang Shin Yuh, Ms Li Hui Cai, Ms Sum Hsin Yin Claire, Ms Siti Khadijah Zainuddin, Mr Marven Ker Weijie, Ms Esther Ker, Ms Pung Li Xin, Ms Chong Shuk Tyng Stephanie (Dept of Pharmacy), Ms Raden Nurheryany Sunari

# NURSING SURVEILLANCE

1

## **Key Project: Development of a machine learning algorithm for risk of developing hospital acquired pressure injuries**

**Aims:** (1) To study the accuracy of deep tissue injury assessment done by nurses through auditing the nursing care record; (2) To classify the types of error associated with the inaccurate pressure injury assessment

**Project team members:** Ms Nanthakumahrie Gunasegaran, Ms Fazila Aloweni, Ms Esther Monica Fan Peijin, Ms Ang Shin Yuh, Ms Siti Zawiyah Mohamad, Mr Sean Whiteley (Axomem Pte Ltd)

2

## **Key Project: Prevalence and factors associated with Diabetes Distress among Adults with Type 2 Diabetes Mellitus (T2DM) in the outpatient tertiary setting**

**Aims:** To explore the prevalence of diabetes distress and its associated factors in adults with Type 2 Diabetes Mellitus (T2DM) in tertiary outpatient setting.

**Project team members:** Ms Teo Wynn Ee, Ms Goh Hui Fen, Ms Chan Yoke Ling, Ms Er Boon Hui, Ms Ou Enjun, Dr Rama Chandran Suresh (Dept of Endocrinology), Ms Ling Shiau Lee, Ms Fazila Aloweni, Dr Lim Siew Hoon

3

## **Key Project: Flipped Classroom Blended Learning Approach for Gerontology Nursing Course**

**Aims:** To develop a flipped classroom blended learning approach and add in community nursing aspect to provide nurses with holistic view of geriatric care from hospital setting to community setting in Singapore

**Project team members:** Ms Minnie Koh, Ms Cheah Le Le, Ms Azlinah Mohamed Kassim

4

## **Key Project: Serious Games Analytics- Differentiating the Novice and Expert Learner**

**Aims:** (1) To develop a method of analysing game-play data to differentiate learners of different levels of expertise, and (2) To track learning process by verifying serious game maximise value-adding behavior.

**Project team members:** Ms Teo Kai Yunn, Ms Fazila Aloweni, Ms Andrea Choh Chau Li, Ms Fan Peijin Esther Monica, Ms Tan Min Yi

5

## **Key Project: Neonatal soundscape**

**Aims:** To characterize the acoustic environment in the NICU within SGH before a scheduled renovation.

**Project team members:** Ms Tay Yih Yann, Mr Lam Bhan (School of Electrical and Electronic Engineering, National Technological University), Ms Fan Peijin Esther Monica, Ms Ang Shin Yuh

# NURSING WORKFORCE



**Key Project: A descriptive study of the adherence, knowledge and challenges of nurses in utilising standard body mechanics for safe manual handling of patients in the acute care setting: A Mixed Method Approach**

**Aims:** To determine the adherence and explore the knowledge and challenges of nurses in utilising body mechanics when manual handling of patients in the acute care settings

**Project team members:** Mr Mohamed Adam Sulaiman, Dr Lim Siew Hoon, Ms Azimah Osman

**Key Project: Building Emotional Resilience Among Health Care Workers Using a Mobile Application Deployed via Staff's Own Devices**

**Aims:** (1) To evaluate the effectiveness, usability and acceptability of mobile-assisted cognitive-behavioural therapy in building resilience among nurses working in the acute care setting

**Project team members:** Dr Lim Siew Hoon, Ms Fazila Aloweni, Ms Ang Shin Yuh, Ms Raden Nurheryany Sunari, Ms Angelina Foo Xiangying

**Key Project: NIMBLE IV Cannulation Game for Training & Assessment**

**Aims:** To develop a market ready version of the minimum viable product (MVP) built by developing further enhancements to the current system and by validating the accuracy of the enhancements.

**Project team members:** Ms Andrea Choh Chau Li, Ms Fan Peijin Esther Monica , Ms Teo Kai Yunn

**Key Project: An exploratory study of experience and effect of second victim symptoms in Nurses from Singapore**

**Aims:** To explore the experience of second victim symptoms and adverse outcomes among nurses in a public tertiary medical centre in Singapore.

**Project team members:** Dr Lim Siew Hoon, Ms Siti Namira Abdul Wahab, Dr Humairah Zainal (Health Services Research Unit), Ms Raden Nurheryany Sunari, Ms Andrea Choh Chau Lin, Ms Tan Min Yi, Ms Teo Kai Yunn, Ms Fazila Aloweni

# CARE TRANSFORMATION & INNOVATION

## Project 1: Thermal Wrist Band

**Purpose:** To create a multi-purpose ready-to-use wrist band that is both waterproof and durable.

**Project Team:** Ms Teo Kai Yunn, Mr Leung Chung Hong, Ms Rachel You, Ms Siti Zawiyah Mohamad



## Project 2: Automatic Bathing Device

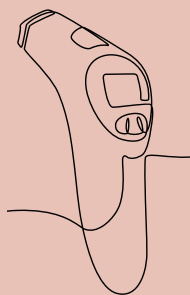
**Purpose:** To ensure a safe bathing system for patients by allowing commode to be parked into device.

**Project Team:** Ms Ang Shin Yuh, Ms Teo Kai Yunn, Ms Li, m Shu Hui, Mr Mohammad Za'ba Aboo (Facilities Management & Engineering)

## Project 3: Asset Tracking

**Purpose:** To ensure easy tracking, assessability, accountability and optimal utilization of medical equipment.

**Project Team:** Ms Ang Shin Yuh, Ms Sanda Thangarajoo, Ms Goh Mei Mei, Mr Shashi Chandra Segaram, Ms Chang Pin Sun, Ms Teo Kai Yunn, Mr Jeremy Boey, Mr Jeremy Zhang, Ms Rachel You, Ms Hui Soh Mei





# CAREGIVER WELL-BEING, EDUCATION & COPING

1

## **Key Project: H@H Buddy**

**Aims:** To ensure the safety of patients, family and care providers in the delivery of The Hospital@Home programme by creating a modular, integrated structure to facilitate the delivery of treatment and health monitoring.

**Project team members:** Dr (APN) Lim Su Fee, Ms Fan Peijin Esther Monica, Ms Juweita Arba'in, Dr (APN) Rachel Marie Towle, Ms Mak Lee Hua Sharon, Ms Gayatri Pravina Thamilselvan, Ms Fazila Aloweni, Dr Lim Siew Hoon

2

## **Key Project: Attitudes and barriers towards uptake of advance care planning and end-of-life care choices among community-dwelling residents with chronic diseases in Singapore: A qualitative descriptive exploratory study**

**Aims:** (1) To explore the attitudes and barriers towards uptake of ACP and (2) EOL care choices such as preferred plan and place of care and preferred place of death among community-dwelling residents with chronic diseases in Singapore.

**Project team members:** Ms Alicia See Min Ting, Dr (APN) Lim Su Fee, Dr Lim Siew Hoon, Ms Tay Hui Lin Amanda, Ms Xu Yi, Prof Low Lian Leng (Dept of Family Medicine & Continuing Care, Dr Siah Chiew Jiat Rosalind (Alice Lee School of Nursing), Ms Mumi Nadhirah Abdul Rahman, Ms Wan Xin Pei

3

## **Key Project: Exploring the knowledge and challenges of patients living with inflammatory bowel Disease in Singapore - A Qualitative Study**

**Aims:** To explore the knowledge, challenges faced and coping mechanisms of patients living with IBD in Singapore.

**Project team members:** Ms Claire Sum Hsin Yin, Ms Fan Peijin Esther Monica, Ms Loy Kia Lan, Dr Lim Siew Hoon, Dr Lim Chong Teik Thomson (Dept of Gastroenterology and Hepatology)

4

## **Key Project: Supporting Self-Management: Understanding the attitudes and perceptions of self-management in patients with venous leg ulcers**

**Aims:** (1) To investigate what are Singaporean's attitudes, perceptions and challenges towards self-management of Venous leg ulcers (VLUs) and (2) To examine the association between sociodemographic and clinical characteristics of patients with VLU and self-efficacy (through self-management practices)

**Project team members:** Ms Leong Wan Ting Chloe, Ms Fazila Aloweni, Dr Lim Siew Hoon, Ms Chua Jia Ying, Ms Sahara Abu Bakar, A/Prof Chong Tze Tec (Dept of Vascular Surgery)

# CAREGIVER WELL-BEING, EDUCATION & COPING

5

**Key Project: Effectiveness of Health Belief Model Based Patient Education on Haemodialysis Patients' Knowledge, Beliefs, and Adherence Level to Post Femoral Non-tunnelled Dialysis Catheter Care**

**Aims:** To evaluate the effectiveness of Health Belief Model based patient education on haemodialysis patients' knowledge, beliefs, and adherence level to post femoral non-tunnelled dialysis catheter care

**Project team members:** Ms Felice Leong Fangie, Dr Lim Siew Hoon, Ms Fazila Aloweni, Ms Pung Li Xin, Ms Chan Mun Yee, Ms Ng Li Choo, Dr Gan Shien Wen (Dept of Renal Medicine), Assoc Prof Choo Jason Chon Jun (Dept of Renal Medicine)

6

**Key Project: Evaluation of knowledge and confidence level of patients discharged with indwelling urinary catheter in the acute care setting**

**Aims:** (1) To determine patient's knowledge level in indwelling urinary catheter care (IDC) and ;(2) To identify patient's confidence level at home with indwelling urinary catheter care following discharge from the acute care setting.

**Project team members:** Mr Ang Eng Ann, Dr Juriyah Yatim, Ms Fazila Aloweni, Dr Lim Siew Hoon





# EVIDENCE BASED NURSING

## 1. Clinical Query: What is the neurovascular management of patients on casts/backslabs?

**Focus:** Neurovascular assessment in patients on casts/backslab, early detection of neurovascular abnormalities and/or pressure injury related to casts/backslab

### Results & Recommendations:

Comparing the assessment findings on bilateral extremities is extremely important as even subtle changes can have significant implications. The frequency of neurovascular assessment must be performed prior to the application of cast/backslab and hourly for the first 24 hours post-application.



## 2. Clinical Query: What are the gaps between the newly graduated nurses' expectations and experience of actual practice and careers?

**Focus:** Expectations and experience

### Results & Recommendations:

Newly graduated nurses do experience fear in their work and organisation is expected to provide mentorship/ orientation program to facilitate nurses. A newly graduate nurse will take 12-24 months to be settled in their work and organisational support is highly required to retain nurses.



# PUBLICATIONS

## Publications (Name of SGH nurses are in bold).

**Aloweni, F.**, Doshi, K., Agus, N., Fook-Chong, S., Wu, S. Y., Kong, L. P., ... & Ostbye, T. (2022). Evaluating the feasibility and effectiveness of a mindfulness-based intervention on stress and anxiety of family caregivers managing peritoneal dialysis. *Proceedings of Singapore Healthcare*, 31, 20101058211054913.

**Aloweni, F.**, Mei, C. S., Lixuan, N. L., Fook-Chong, S., Yobas, P., **Yuh, A. S.**, ... & Maniya, S. (2022). Healing outcomes and predictors among patients with venous leg ulcers treated with compression therapy. *Journal of Wound Care*, 31(Sup3), S39-S50.

**Aloweni, F.**, Uthaman, T., Agus, N. L., Xian, T. W., Maniya, S., **Yuh, A. S.**, & Tec, C. T. (2022). The cost of venous leg ulcers in a Singapore tertiary hospital: An explorative study. *Wound Practice & Research: Journal of the Australian Wound Management Association*, 30(2), 75-81.

**Aloweni, F.**, Ayre, T. C., Teo, I., Tan, H. K., & **Lim, S. H.** (2022). A year after COVID-19: Its impact on nurses' psychological well-being. *Journal of nursing management*, 30(7), 2585-2596. <https://doi.org/10.1111/jonm.13814>

Arman, S. N, Lee, Y.H., Lopez, V., & **Lim, S.H.** (2022). Subjective sleep quality among hospitalised adult patients: An observational, cross-sectional study. *Proceedings of Singapore Healthcare* 31 doi: 20101058221111664.

**Fan, E. M.P., Ang, S.Y., Aloweni, F., & Rajasegeran, D.D.** (in press). Efficacy of a Bedside Activity Device in Improving Functional Ability of Hospitalised Elderly: A Randomised Controlled Trial. *American Journal of Nursing*.

Graves, N., **Aloweni, F.**, Raju., M., **Ang, S.Y.**, Bishnoi, P., Chong, T.T., & Carmody, D. (in press). A retrospective matched cohort study of incidence rates and excess length of hospital stay due to pressure injuries in an Asian setting. *Journal of Health Care Science*.

**Gunasegaran, N.**, Seah, V. Q. H., **Ang, S. Y.**, **Aloweni, F.**, **Goh, W. T.**, Liew, A. Y. J., . . . Chong, T. T. (2022) Maggot debridement therapy in the tropics - Preliminary outcomes from a tertiary hospital. *Journal of Tissue Viability*, 31(3), 544-551. Doi:10.1016/j.jtv.2022.05.006

Lam, B., **Fan, E. M. P.**, Ooi, K., Ong, Z.-T., Hong, J. Y., Gan, W.-S., & **Ang, S. Y.** (2022). Assessing the perceived indoor acoustic environment quality across building occupants in a tertiary-care public hospital in Singapore. *Building and Environment*, 222, 109403. doi:10.1016/j.buildenv.2022.109403

**Lim, S.H., Aloweni, F., Ang, S.Y.**, Ayre, T.C., Uthaman, T., Hassan, N., Lee, K.H., Lee, W.T., Ngoh, S.H., Chua, Y.J., Chen, L.J., & Shorey, S. (in press). Memories of Nursing in Singapore - an oral history approach. *Journal of Research in Nursing*.

# PUBLICATIONS

**Lim, S. H., Wahab, S. N. B. A., Ang, S. Y.,** Teh, M. M., & **Aloweni, F.** (2022). Evaluation of Care Outcomes of Patients Receiving Hyperkalemia Treatment With Insulin in Acute Care Tertiary Hospital Emergency Department. *Journal of Emergency Nursing*. doi:<https://doi.org/10.1016/j.jen.2022.09.009>

Liow, M. H. L., **Lee, L. C.,** Tan, N. C. K., Tan, H. K., Chow, W., Wee, G. L. E., . . . Ling, M. L. (2022). Personal protective equipment training for non-healthcare workers in the Covid-19 pandemic: Effectiveness of an evidence-based skills training framework. *Infection, Disease & Health*, 27(1), 38-48. doi:10.1016/j.idh.2021.09.040

**Long, D. S.,** Kelly, M. A., & **Lim, S. H.** (2022). Risk factors, prevention and treatment of hypoglycaemia after hyperkalaemia in adult patients using intravenous insulin: An integrative review. *International journal of nursing practice*, e13080. Advance online publication. <https://doi.org/10.1111/ijn.13080>

**Peng, J., Ang, S. Y.,** Zhou, H., & Nair, A. (2022). The effectiveness of radiofrequency scanning technology in preventing retained surgical items: An integrative review. *Journal of Clinical Nursing*,10.1111/jocn.16447.Advance online publication.<https://doi.org/10.1111/jocn.16447>

**Rajasegeran, D. D., Aloweni, F.,** Lim, X., Chandra Sekaran, S., Nguyen, C. P., Zhang, L., . . . Chong, S. J. (2022). A prospective comparative study on the effectiveness of two different non-adherent polyurethane dressings on split-thickness skin graft donor sites. *Journal of Tissue Viability*, 31(3), 531-536. doi:10.1016/j.jtv.2022.04.007

Venkatachalam, I., **How, M. K. B.,** Ko, K. K. K., Rahman, N. B. A., Conceicao, E. P., Aung, M. K., ... & Ling, M. L. (2022). Healthcare-associated multispecies outbreaks of OXA-48-positive carbapenemase-producing Enterobacteriaceae in a Singapore tertiary-care hospital. *Infection Control & Hospital Epidemiology*, 1-9.

Wan, S. W., Chong, C. S., Toh, E. L., **Lim, S. H.,** Loi, C. T., Lew, Y. F. H., ... & He, H. G. (2021). A Theory-Based, Multidisciplinary Approach to Cocreate a Patient-Centric Digital Solution to Enhance Perioperative Health Outcomes Among Colorectal Cancer Patients and Their Family Caregivers: Development and Evaluation Study. *Journal of medical Internet research*, 23(12), e31917.

Wan, S. W., Chng, Y. J. D., **Lim, S. H.,** Chong, C. S., Pikkarainen, M., & He, H. G. (2022). A systematic review and meta-analysis on the effectiveness of web-based psychosocial interventions among patients with colorectal cancer. *Journal of Advanced Nursing*. 78(7), 1883-1896. <https://doi.org/10.1111/jan.15258>

**Xu, Y.,** Koh, X. H., Chua, Y. T. S., **Tan, C. G. I., Aloweni, F. A. B.,** Yap, B. E. J., . . . **Lim, S. F.** (2022) The impact of community nursing program on healthcare utilization: A program evaluation. *Geriatric Nursing*, 1-11. doi: .1016/j.gerinurse.2022.04.024

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