

25 - 27 August 2016

## HEALTHCARE FOR THE FUTURE

Shifting Paradigms for Population,  
Patients and Professionals



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# SMJ

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## ORGANISING COMMITTEE

### Organising Chairpersons

#### ALEXANDRA HEALTH FORUM CHAIRPERSONS

Dr Benjamin Lam Chih Chiang, Consultant,  
Family and Community Medicine  
Dr Serena Low, Consultant, Clinical Research Unit

#### NURSING FEST CHAIRPERSONS

Ms Shirley Heng, Deputy Director, Nursing, Nursing Administration  
Ms Audrey Saw, Assistant Director, Nursing, Nursing Administration

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#### NURSING FEST SCIENTIFIC CHAIR

Ms Shirley Heng, Deputy Director, Nursing, Nursing Administration

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Dr Chang Kok Meng, Consultant, Dental Surgery  
Dr Ester Yeoh, Consultant, General Medicine  
Dr Djon Huang, Principal Staff Physician, Geriatric Medicine  
Ms Gladys Wong, Chief Dietitian, Nutrition and Dietetics  
Dr Jason Cheng, Consultant, Ophthalmology and Visual Sciences  
Ms Jernice Aw, Research Officer, Pharmacy  
Ms Kang Yuen Kay, Senior Pharmacist, Pharmacy  
Ms Kylie Siu, Senior Physiotherapist, Rehabilitation Services  
Dr Ng Yeuk Fan, Deputy Director, Special Projects

#### NURSING FEST COMMITTEE MEMBERS

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Manager, Acute and Emergency Care  
Ms Laura Tham Schmidt, Nurse Clinician, Ageing-In-Place  
Ms Carol Ng, Senior Nurse Manager, Diagnostic Radiology  
Ms Mary Getrude Hubback, Nurse Manager, Inpatient Wards  
Ms Jasber Kaur, Assistant Nurse Clinician, Inpatient Wards  
Ms Cherie Koh, Nurse Manager, Inpatient Wards  
Ms Lim Shui Ling, Nurse Manager, Inpatient Wards  
Ms Liu Xiaoyan, Senior Nurse Manager, Inpatient Wards  
Ms Yap Suk Foon, Nurse Clinician, Inpatient Wards  
Ms Jamilah Bte Hussin, Executive Secretary, Nursing Administration  
Ms Yeo Ai Ling, Nurse Clinician, Peri-Operative Services  
Ms Pua Lay Hoon, Deputy Director of Nursing,  
Woodlands Integrated Health Campus

### Advisors

A/Prof Lim Su Chi, Clinical Director, Clinical Research Unit  
Dr Angela Koh, Senior Consultant, General Medicine  
Dr Wong Chek Hooi, Senior Consultant, Geriatric Medicine  
Ms Alice Leong, Deputy Director, Nursing, Peri-Operative Services

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## Organising Committee Members

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Dr Willie Koh, Senior Manager,  
Clinical Research Unit

#### Event Administrator

Ms Rachel Gan, Senior Executive,  
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## Message from the Organising Committee

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Dear friends and colleagues,

The Alexandra Health Forum in conjunction with Nursing Fest is a much anticipated biennial event that brings together like-minded healthcare professionals, to exchange ideas, share experiences and learn from each other. In addition, this year's event will bring together various healthcare partners to facilitate networking and relationship building. We are indeed delighted to have you with us.

The theme of this year's forum is 'Healthcare for the Future: Shifting Paradigms for Population, Patients and Professionals'. We recognise that the healthcare landscape is ever changing because of the increasing demand for healthcare and rapidly advancing technology. Consequently, healthcare solutions for today may no longer apply tomorrow, thereby necessitating paradigm shifts in the way we look after the population, patient and professional.

With this in mind, we have lined up an exciting and enriching programme, with speakers from various healthcare and academic institutions, and an array of learning platforms from pre-conference workshops, oral and poster presentations, symposiums, breakout sessions to panel discussions.

Furthermore, we are pleased to present the numerous abstracts that have been submitted and accepted for this year's event. These abstracts – categorised into Basic Science Research, Clinical Research and Quality Improvement – represent not only the breadth of knowledge in healthcare, but also the new and evolving knowledge uncovered by research.

Therefore, we hope that these three days will be a rewarding one, and the knowledge gained, partnerships formed and ideas derived from this event will ultimately benefit the people under our care.

Welcome and enjoy!

**Dr Benjamin Lam Chih Chiang & Dr Serena Low**

*Chairpersons, Alexandra Health Forum 2016*

**Ms Shirley Heng & Ms Audrey Saw**

*Chairpersons, Alexandra Health Nursing Fest 2016*

## Message from the Group Chief Executive Officer

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**Mr Liak Teng Lit**

Group Chief Executive Officer  
Alexandra Health System

Life has improved for many people – we live longer and we have better quality of life. One of the reasons is the result of advances in medical sciences. We, the healthcare professionals, deserve some of the credit for providing care to treat patients and help them get well.

Advances in genomics, information management and technologies, artificial intelligence, robotics, wearable devices, implants and new treatment modalities will bring about great opportunities for us to improve care for patients. We can and should look toward the future with great optimism and anticipation.

But we should also see the world through a clear lens and reflect more on what we are doing.

Let's take a look at Mr Tan, an 81-year-old. He is bedridden, ADL-dependent (activities of daily living-dependent) and tube-fed. He is unable to communicate, except to indicate when he is in distress or pain. In his younger days, he was overweight and a heavy smoker. At the age of 58, he suffered a massive stroke. He spent several months in hospital, before he was discharged to a nursing home where he has been a resident for the past 20 years. He is likely to live for another ten years or more.

Some may consider Mr Tan's story a success of medical science. He is "alive". However, I believe that the meaning of "success" depends on our paradigm and perspectives.

If we are happy to be in Mr Tan's position, or in the shoes of the caregivers who attend to his needs 24/7 for another 10–20 years, we should celebrate our achievements and do this for all our patients. If not, we should reflect and ask ourselves what we should be doing.

Healthcare costs are rising rapidly in many developed societies at unsustainable rates. Much of these costs are incurred in expensive acute care hospitals. Often, it is the case of much ado but too late. Mr Tan might have had a much better quality of life and incurred much less healthcare costs if he had taken better care of himself before his stroke.

It has become almost a cliché to say that healthcare systems need to do more in health promotion and preventive health. Yet, very little resources are actually committed to this area of healthcare and much of what is done often deemed ineffective. Understanding and application of behavioural science may bring about better public awareness, but implementation will remain a challenge.

Medical advancements have pushed Singaporeans' average life expectancy to 82.8 years over the past two decades. However, on average, about seven of these years will be of poor quality. Today, sudden deaths account for only about 3% of deaths, while dying from terminal illness after a few months of illness accounts for around 15% of deaths. More often than not, patients die only after years of ill health punctuated with frequent hospitalisations, or after years spent in extremely poor mental and physical health, bedridden or semi-bedridden, in nursing homes and hospitals.

However, this is not the way that most elderly people want to live out their final days. Many prefer to age and die in their own homes, and I believe that we should develop services beyond hospitals, into the community and homes, to enable this. This way, we can help seniors age well and die well with dignity, rather than merely extending the dying process.

## About Alexandra Health Forum

Healthcare is constantly evolving in tandem with emerging challenges. There is an increasing demand for healthcare due to our ageing population. The prevalence of chronic diseases is also on the rise, requiring more than just the healthcare providers to manage them. Among healthcare professionals, compartmentalisation, together with increasing specialisation and subspecialisation, hampers the delivery of holistic care. Moreover, the proliferation of new medical technology and information necessitates renewed training to ensure the competency of healthcare professionals.

A paradigm shift across the healthcare ecosystem must occur in order for us to tackle the current challenges and to ensure a sustainable high quality of care. Fortunately, we are beginning to notice a gradual transformation in the healthcare landscape. At the population level, there is an increasing recognition of the need to integrate healthcare with the community. At the hospital level, collaborative care is increasingly adopted as the new model of care. At the professional level, continuous efforts are made to nurture healthcare professionals to meet the current needs and expectations. Despite these transformations, there is still a need to move beyond our boundary to search for new frontiers.

At this year's forum, we strive to create a platform for the exchange of experiences, ideas and visions to develop a better healthcare ecosystem for the future. Perspectives from medical, nursing, allied health and administration domains will be shared, for a common purpose: to navigate the complexities of healthcare as one healthcare family, facing the challenges of today and working toward meeting the needs of the future.

### Icons for Alexandra Health Forum in conjunction with Nursing Fest 2016



#### **Shifting Paradigms for POPULATION**

We aim to promote and raise awareness on self-care, health and prevention of diseases in the community.



#### **Shifting Paradigms for PATIENTS**

We explore how multidisciplinary and transdisciplinary collaborative care can be delivered and synergised.



#### **Shifting Paradigms for PROFESSIONALS**

We examine how to build and nurture our healthcare workforce for the future through new training frameworks and technology.

# Alexandra Health Forum 2016 Programme

## DAY 1: 25 August 2016, Thursday

DAY 1	Healthcare for the Future: Shifting Paradigms for Population (Promoting Self Care, Health and Preventing Disease)					
0800 - 0830	Registration (@ KTPH Learning Centre)					
0830 - 1015	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	Workshop 6
	Improving Health and Preventing Disease through Tailored Diet and Lifestyle Prescriptions  A/Prof Tao Huang, Assistant Professor, Epidemiology Domain of Saw Swee Hock School of Public Health, Department of Medicine of Yong Loo Lin School of Medicine, NUS	Homecare Management  Ms Suvian Toh Shu Yun, Advanced Practice Nurse, Ageing-In-Place, Community Care Team, AHS	Care of Stroke Patients  Ms Annuradhaa Ravi, Senior Physiotherapist, Rehabilitation services, KTPH  Dr Jasmyn Angon, Registrar, Neurology, Geriatric Medicine, KTPH  Ms Lim Yujun, Senior Speech Therapist, Rehabilitation Services, KTPH  Ms Chen Ziyun, Occupational Therapist, Rehabilitation Services, KTPH  Ms Chua Yea Chyi, Case Manager, Case Management, KTPH  Ms Goh Soon Pang, Advanced Practice Nurse (Intern), Department of Nursing, KTPH	Mindfulness in Healthcare  Dr Ong Seh Hong, Senior Consultant, Psychological Medicine, KTPH	Advance Care Planning (ACP) – Hear My Voice, Respect My Choice  Ms Sim Lai Kiow, Nurse Clinician, Advance Care Planning, KTPH  Ms Evon Tay Yi Wen, Executive, Advance Care Planning, KTPH	Improving Healthcare Service Delivery via Prescriptive Analytics  Prof Melvyn Sim, Professor & Provost's Chair, Department of Decision Sciences, NUS Business School
	Preventing Obesity - a Developmental Approach  Dr Mary Foong-Fong Chong, Assistant Professor, Saw Swee Hock School of Public Health, NUS					
1030 - 1100	Tea Break					
1100 - 1200	Opening Ceremony					
	Opening Performance Opening Speech by Chairpersons Welcome Speech by Mr Liak Teng Lit, GCEO, AHS Speech by Guest-of-Honour, Dr Amy Khor, Senior Minister of State, MEWR & MOH					
1200 - 1300	Plenary Lecture 1: A Vision for Promoting Health and Achieving Health Equity Dr R. D. Ravindran, Chairman, Aravind Eye Care System, Madurai, India					
1300 - 1400	Networking Lunch / Guided Poster Tour 1					
1400 - 1530	Symposium 1: Shifting Paradigms for Population Chair: Dr Michael Wong Tack Keong, Head & Senior Consultant, Family & Community Medicine, KTPH					
	Forecasting the Future Burden of Diseases in Singapore A/Prof Alex Cook, Associate Professor, Saw Swee Hock School of Public Health, NUS					
	Health Screening in Singapore Ms Christine Fock, Deputy Director, Screening Policy & Planning Department, Regional Health & Community Outreach Division, HPB					
	Population Health in the North Dr Michael Wong Tack Keong, Head & Senior Consultant, Family & Community Medicine, KTPH Integration of Healthcare Partners and Resources in the Community: A Promising Vision A/Prof Philip Yap Lin Kiat, Senior Consultant & Director, Geriatric Centre, KTPH					
1530 - 1600	Tea Break / Guided Poster Tour 2					
1600 - 1655	Breakout Session 1	Breakout Session 2	Breakout Session 3		Breakout Session 4	
	Organising Community Care Teams - The Experience of ComSA in Whampoa  Ms Peh Kim Choo, Chief, Programmes, Tsao Foundation	Dying with Dignity  Ms Yau Sew Peng, Senior Staff Nurse, Geriatric Clinic, Palliative Care, KTPH  Ms Tan Seng Wah, Advance Care Planning Facilitator, Advance Care Planning, KTPH	The Future of Health Promotion  Ms Vasuki Utravathy, Deputy Director, Strategic Planning & Collaborations, HPB		Hospitals and Healthcare Systems of the Future  Dr Terence Tang Eng Yeow, Deputy Chairman, Medical Board (Care Integration), Head & Senior Consultant, Geriatric Medicine, KTPH  Dr Ng Yeuk Fan, Deputy Director, Special Projects, AHS	
1700 - 1730	Plenary Lecture 2: Nursing the Community: Needs and Challenges Dr Lina Ma Yee Sheung, Director, Clinical/Aged Care Services, Lions Home for the Elders					
1730 - 1930	Gala / Social Event					
	End of Day 1					

## DAY 2: 26 August 2016, Friday

DAY 2	Healthcare for the Future: Shifting Paradigms for Patients (Promoting Collaborative and Quality Care: Silos to Synergy)					
0800 - 0830	Registration (@ KTPH Learning Centre)					
0830 - 1000	<b>Symposium 2: Collaborative Care - Silos to Synergy</b> <i>Chair: A/Prof Tan Kok Yang, Head &amp; Senior Consultant, General Surgery, KTPH</i>  <b>Disciplinary to Transdisciplinary Care</b> <i>A/Prof Tan Kok Yang, Head &amp; Senior Consultant, General Surgery, KTPH</i>  <b>Integrating and Improving Chronic Disease Management: Diabetes Mellitus</b> <i>A/Prof Subramaniam Tavintharan, Head &amp; Senior Consultant, Diabetes Centre, KTPH</i>  <b>8 Ideas in Organising Collaborative Care in the Tertiary Hospital</b> <i>A/Prof Thomas Lew Wing Kit, Chairman of Medical Board, TTSH</i>  <b>Ambulatory Care: Team-Based Approaches</b> <i>Dr Ng Wei Liang David, Family Physician, Associate Consultant &amp; Clinic Head, Toa Payoh Polyclinic, NHGP</i>					
1000 - 1045	Tea Break / Guided Poster Tour 3					



1045 - 1215	<b>Symposium 3: Shifting Paradigm in Healthcare - Past, Present and Future</b> <i>Chair: Dr Benjamin Lam Chih Chiang, Consultant, Family &amp; Community Medicine, KTPH</i>			
	<b>Better Health, Better Care, Better Life</b> <i>A/Prof Kenneth Mak Seck Wai, Deputy Director Medical Services, Health Services Group, MOH</i> <b>The Evolution of Community Care and Ageing Population</b> <i>A/Prof Pang Weng Sun, Chairman of Medical Board, YCH</i> <b>Acute Care and Hospital Care - Future and Challenges</b> <i>A/Prof Pek Wee Yang, Chairman of Medical Board, KTPH</i> <b>The Evolution of Medical Education</b> <i>Prof C Rajasoorya, Senior Consultant, General Medicine, KTPH</i>			
1215 - 1300	<b>Breakout Session 5</b>	<b>Breakout Session 6</b>	<b>Breakout Session 7</b>	<b>Breakout Session 8</b>
	<b>Trauma Care: Evolving Trends and Improving Outcomes</b> <i>Dr Chiu Ming Terk, Senior Consultant, Head of General Surgery &amp; Director of Trauma, TTSH</i>	<b>Geriatric Surgical Service Model</b> <i>Chair: Adj Asst Prof Surendra Kumar Mantoo, Consultant, General Surgery, KTPH</i> <i>Adj Asst Prof Sim Hsien Lin, Consultant, General Surgery, KTPH</i> <i>Dr Geraldine Cheong, Consultant, Anaesthesia, KTPH</i> <i>Ms Phyllis Tan Xiuzhuang, Nurse Clinician, Nursing Administration, KTPH</i> <i>Mr Sunny Tan Boon Chai, Physiotherapist, Rehabilitation Services, KTPH</i>	<b>Patient-Centred Integrative Rehabilitation Service</b> <i>Mr Adon Chan Hock Kiong, Principal Physiotherapist, Rehabilitation Services, YCH</i>	<b>Empowering Patients</b> <i>Dr Chan Keen Loong, Senior Consultant &amp; Head of Department, Psychological Medicine, &amp; Project Director, THRIVE, Psychological Medicine, KTPH</i>
1300 - 1400	<b>Networking Lunch / Guided Poster Tour 4</b>			
1400 - 1500	<b>Oral Abstract Presentation 1</b>			
1500 - 1630	<b>Symposium 4: Collaborative Care - Silos to Synergy</b> <i>Chair: Dr Mallya Ullal Jagadish, Senior Consultant, Geriatric Medicine, KTPH</i>			
	<b>Transcending Care Across Settings: AHS Hip Fracture Service</b> <i>Dr Mallya Ullal Jagadish, Senior Consultant, Geriatric Medicine, KTPH</i> <b>Polypharmacy</b> <i>Mr Tan Jianming, Senior Pharmacist, Pharmacy, KTPH</i> <b>Transdisciplinary Cancer Care</b> <i>A/Prof Simon Ong Yew Kuang, Senior Consultant, Division of Medical Oncology, NCCS</i> <b>Coordinated Health and Social Care: What Would It Take to Really Make It Happen?</b> <i>Ms Han Yah Yee, Group Director, Social Services, Montfort Care</i>			
1630 - 1700	<b>Tea Break / Guided Poster Tour 5</b>			
1700 - 1800	<b>Panel Discussion 1: Teaming Up with Patients, Families, and Community to Improve Healthcare</b> <i>Chair: Ms Shirley Heng, Deputy Director, Nursing Administration, KTPH</i> <i>Mrs Chew Kwee Tiang, Chief Executive Officer, KTPH</i> <i>Dr Pauline Tan, Chief Executive Officer, YCH</i> <i>Dr Wong Sweet Fun, Chief Transformation Officer, AHS, Deputy Chairman, Medical Board, YCH, Senior Consultant, Geriatric Medicine, KTPH</i>			
	<b>End of Day 2</b>			

**DAY 3: 27 August 2016, Saturday**

<b>DAY 3</b>	<b>Healthcare for the Future: Shifting Paradigms for Professionals (Nurturing Healthcare Workforce for Better Healthcare)</b>				
0800 - 0845	<b>Registration (@ KTPH Learning Centre)</b>				
0845 - 0945	<b>Oral Abstract Presentation 2</b>				
0945 - 1045	<b>Breakout Session 9</b>	<b>Breakout Session 10</b>	<b>Breakout Session 11</b>	<b>Breakout Session 12</b>	<b>Breakout Session 13</b>
	<b>Healthcare for the Future: Shifting Paradigms for Professionals (Nurturing Healthcare Workforce for Better Healthcare)</b> <i>Adj A/Prof Tham Kum Ying, Education Director &amp; Senior Consultant, Pre-Professional Education Office &amp; Emergency Department, TTSH</i>	<b>Shifting Paradigm in Geriatric Care: Ageing without Dementia</b> <i>A/Prof Ng Tze Pin, Research Director, Gerontological Research Programme, Department of Psychological Medicine, Yong Loo Lin School of Medicine, NUS</i> <b>Genomic Medicine for Clinicians - Ready to Shift Paradigm?</b> <i>A/Prof Lim Su Chi, Clinical Director, Clinical Research Unit, KTPH</i>	<b>Professionalism &amp; Ethics</b> <i>Dr Lawrence Tan Wei Meng, Senior Consultant, Geriatric Medicine, KTPH</i>	<b>Embarking on "The Scorch Trials" for Healthcare Education through Games-Based Learning</b> <i>Dr Kevin Yap Yi-Lwern, Lecturer, Department of Pharmacy, Faculty of Science, NUS, Designated Champion of the Health IT Master Plan Capability Planning (HITCAP) Project, Ministry of Health, Singapore, NUS Representative of the National Pharmacy Strategy (NPS) Project Team</i>	<b>Continuing Professional Nursing Education - More than a Program</b> <i>Dr Ann Marie Rice, Senior University Teacher, Deputy Head, Nursing &amp; Health Care School, University of Glasgow</i>
1045 - 1100	<b>Tea Break</b>				
1100 - 1200	<b>Symposium 5: Shifting Paradigms for Professionals</b> <i>Chair: A/Prof Sum Chee Fang, Senior Consultant, Diabetes Centre, KTPH</i>				
	<b>Family Medicine Training Vision for Singapore Today and Tomorrow - Mainstreaming A Paradigm Shift</b> <i>A/Prof Goh Lee Gan, Professorial Fellow, Division of Family Medicine, Department of Medicine, NUHS</i> <b>New Nursing Professional: What Matters Most?</b> <i>Ms Low Beng Hoi, Chief Nurse, AHS</i> <b>Healthcare Management</b> <i>Prof Philip Choo Wee Jin, Group Chief Executive Officer, NHG</i>				
1200 - 1230	<b>Plenary Lecture 3: Resident Training: Training the Future Medical Professional</b> <i>A/Prof Nicholas Chew Wuen Ming, Group Chief Education Officer, NHG</i>				
1230 - 1300	<b>Closing Ceremony</b>				
	Prize Presentations Closing Address by Chairperson				
1300 - 1400	<b>Yishun Community Hospital Tour</b>				
	<b>End of Forum</b>				

## Schedule for Oral Presentation

Time	Abstract No.	Title	Category	Presenter
<b>26 August 2016, Friday, Auditorium</b>				
Session Moderators: <b>A/Prof Lim Su Chi</b> , Clinical Director, Clinical Research Unit, KTPH; <b>Ms Pua Lay Hoon</b> , Deputy Director of Nursing, WIHC				
2:00pm	AHF16QA001	Impact of transdisciplinary pharmacist-physician collaboration on cardiovascular disease outcomes in the Cardiology Pharmacist Clinic of Khoo Teck Puat Hospital	Quality Improvement (Allied Health)	Ms Brenda Chong Soon Mun, Pharmacist, Pharmacy, KTPH
2:10pm	AHF16QA002	Reducing fentanyl errors	Quality Improvement (Allied Health)	Ms Elissa Wong Wai Yan, Pharmacist, Pharmacy, KTPH
2:20pm	AHF16QN001	Eye clinic nurse-led preoperative assessment improves cataract surgery lead time and patient satisfaction and reduces anaesthesia clinic workload	Quality Improvement (Nursing)	Ms Rostihar Bte Abdul Karim, Principal Assistant Nurse, Specialist Outpatient Clinic, KTPH
2:30pm	AHF16QN002	Fast track protocols-driven service	Quality Improvement (Nursing)	Mr Chun Bong Siu, Kwong Wah Hospital, Hong Kong
2:40pm	AHF16QP001	Reducing inpatient hypoglycaemia among inpatients with diabetes mellitus in two pilot wards	Quality Improvement (Physician)	Dr Ester Yeoh, Consultant, Medicine, KTPH
2:50pm	AHF16QP002	Mobile Ophthalmic Slit-lamp Examination System (MOSES)	Quality Improvement (Physician)	Adj A/Prof Yip Chee Chew, Head & Senior Consultant, Ophthalmology & Visual Sciences, KTPH
<b>27 August 2016, Saturday, Auditorium</b>				
Session Moderators: <b>Adj Asst Prof Surendra Kumar Mantoo</b> , Consultant, General Surgery, KTPH; <b>Ms Velusamy Poomkothammal</b> , Assistant Director, Nursing Administration, KTPH				
8:45am	AHF16BS001	Genomic medicine in diabetes mellitus: whole exome sequencing as a tool for identifying novel genetic variants responsible for monogenic diabetes mellitus in a pedigree study	Basic Science	Dr Ang Su Fen, Senior Research Officer, Clinical Research Unit, KTPH
8:55am	AHF16BS002	Elevated plasma leucine-rich alpha-2-glycoprotein 1 is associated with diabetic retinopathy in Asians with type 2 diabetes mellitus	Basic Science	Dr Catherina Josephine Goenadi, Medical Officer, Ophthalmology & Visual Sciences, KTPH
9:05am	AHF16CA001	Use of cognitive enhancers in Khoo Teck Puat Hospital memory clinic: a retrospective study	Clinical (Allied Health)	Ms Low Suat Fern, Principal Pharmacist, Pharmacy, YCH
9:15am	AHF16CN001	Roux-en-Y gastric bypass versus the best medical treatment for type 2 diabetes mellitus with body mass index of 27–32: preliminary result of a randomised controlled trial	Clinical (Nursing)	Ms Bernice Tan Li Ting, Research Nurse, General Surgery, KTPH
9:25am	AHF16CP001	Flexible Nasoendoscopy decontamination, a comparison between Rapicide and Tristel wipes	Clinical (Physician)	Dr Alex Mathews, Senior Staff Physician, ENT, KTPH
9:35am	AHF16CP002	Navigating the paradigm of chronic kidney disease in type 2 diabetes mellitus: useful lessons and prediction model based on a 13-year prospective cohort study	Clinical (Physician)	Dr Serena Low, Consultant, Clinical Research Unit, KTPH

## Schedule for Guided Poster Tour

To encourage poster viewing, guided poster tours by expert moderators are arranged. A short presentation of selected posters will be done by the abstract authors/designated presenters. **Please meet at the 1<sup>st</sup> poster indicated for each guided poster tour respectively, before the tour begins.**

Time	Category/Poster No.	Moderator
<b>25 August 2016, Thursday</b>		
Guided Poster Tour 1 1:00pm - 2:00pm	<b>AHF16BS003 - AHF16BS007:</b> Basic Science <b>AHF16CP003 - AHF16CP005:</b> Clinical (Physician)	<b>Dr Chang Kok Meng</b> Consultant, Dental Surgery, KTPH <b>Dr Jason Cheng</b> Consultant, Ophthalmology and Visual Sciences, KTPH
Guided Poster Tour 2 3:30pm - 4:00pm	<b>AHF16CP006 - AHF16CP007:</b> Clinical (Physician) <b>AHF16CN002 - AHF16CN003:</b> Clinical (Nursing)	<b>Dr Ester Yeoh</b> Consultant, General Medicine, KTPH <b>Ms Cherie Koh</b> Nurse Manager, Inpatient wards, KTPH
<b>26 August 2016, Friday</b>		
Guided Poster Tour 3 10:00am - 10:45am	<b>AHF16QN003 - AHF16QN007:</b> Quality Improvement (Nursing) <b>AHF16QA003 - AHF16QA004:</b> Quality Improvement (Allied Health)	<b>Dr Ng Yeuk Fan</b> Deputy Director, Special Projects, AHS <b>Ms Yap Suk Foon</b> Nurse Clinician, Inpatient wards, KTPH
Guided Poster Tour 4 1:00pm - 2:00pm	<b>AHF16QA005 - AHF16QA007:</b> Quality Improvement (Allied Health) <b>AHF16QP003 - AHF16QP007:</b> Quality Improvement (Physician)	<b>Dr Djeni Huang</b> Principal Staff Physician, Geriatric Medicine, KTPH <b>Ms Kang Yuen Kay</b> Senior Pharmacist, Pharmacy, KTPH
Guided Poster Tour 5 4:30pm - 5:00pm	<b>AHF16CA002 - AHF16CA005:</b> Clinical (Allied Health)	<b>Dr Justin Tang</b> Associate Consultant, Cardiology, KTPH <b>Ms Laura Tham Schmidt</b> Nurse Clinician, Ageing-in-Place, AHS

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AHF2016 Online Abstract Supplement:



## Day 1: Workshops

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### Workshop 1



#### Improving Health and Preventing Disease through Tailored Diet and Lifestyle Prescriptions

*A/Prof Tao Huang, Assistant Professor, Epidemiology Domain, Saw Swee Hock School of Public Health and Department of Medicine, Yong Loo Lin School of Medicine, National University of Singapore*

#### ABSTRACT

The epidemic of obesity has become a major threat to public health. Data from numerous molecular and genetic epidemiological studies has provided tantalising evidence to suggest that obesity is underpinned by both environmental and genetic factors. This workshop provides updates on the recent advances in identifying the genetic factors for obesity. I will also share my findings on gene-diet interaction in obesity from observational studies and introduce how findings can be translated to clinical actions using data from randomised intervention trials. Knowledge obtained from research has important public health and clinical implications. Identifying individuals by genetic makeup with different responses to dietary intervention could significantly enhance the effectiveness of clinical patient care and facilitate the choice of more specific measures for obesity prevention based on personalised genetic makeup.



#### Preventing Obesity – a Developmental Approach

*Dr Mary Foong-Fong Chong, Assistant Professor, Saw Swee Hock School of Public Health, National University of Singapore*

#### ABSTRACT

Globally, the prevalence of overweight and obesity in children and adults has risen dramatically. While overweight children are at a higher risk of being overweight in adulthood, adult obesity is associated with an increased risk of non-communicable diseases, such as cardiovascular diseases, cancer and diabetes mellitus. The prevention of obesity, particularly in children, is now recognised as an international public health priority. However, obesity prevention interventions targeted at adults, adolescents and school-aged children over the years have been met with limited success. This is not surprising, since we are combating entrenched habits and behaviours that have developed from early life and reinforced through a lifetime of exposure.

The concept of developmental programming sets a new paradigm for rethinking new strategies in obesity prevention. It recognises that exposure to an unfavourable environment during development (e.g. ‘sensitive periods’ *in utero* and during infancy) programmes changes in the fetus and neonate such that the individual has a greater risk of developing diseases in adulthood. These biological and behavioural developmental influences also have profound long-term consequences on appetite regulation and food preferences, consequently affecting body weight regulation.

This workshop examines the transgenerational effects of maternal obesity on infant adiposity and health outcomes, and highlights the importance of optimal pregnancy nutrition and positive early feeding experiences as interventional opportunities to prevent or reduce obesity.

## Workshop 2



### Homecare Management

*Ms Suvian Toh Shu Yun, Advanced Practice Nurse, Ageing-In-Place, Community Care Team, Alexandra Health System*

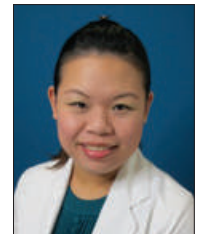
#### ABSTRACT

With the increase in ageing populations, there is a shift of healthcare paradigm from the hospital to the home. Today, patients with complex medical conditions can be managed in the comfort of their home through comprehensive assessment and prevention of complications by multi-disciplinary healthcare professionals.

This workshop adopts an interactive case study discussion. It allows participants to understand the importance of adopting a holistic approach when assessing an elderly patient in the community, taking into account the medical, nursing, physical and psychosocial issues. It is supplemented with an overview of the currently available community services that aim to help seniors remain integrated within the community. The Community Care Team of Ageing-In-Place at Alexandra Health System has helped many patients with complex conditions to be discharged home smoothly.

This workshop is useful for doctors, nurses and allied health professionals, as the delivery of multidisciplinary care is crucial for effective overall management of patients in the community.

## Workshop 3



### Care of Stroke Patients

*Ms Annuradhaa Ravi, Senior Physiotherapist, Rehabilitation Services; Dr Jasmyn Angon, Registrar, Neurology, Geriatric Medicine; Ms Lim Yujun, Senior Speech Therapist; Ms Chen Ziyan, Occupational Therapist, Rehabilitation Services; Ms Chua Yea Chyi, Case Manager, Case Management; Ms Goh Soon Pang, Advanced Practice Nurse (Intern), Department of Nursing, Khoo Teck Puat Hospital*

#### ABSTRACT

This workshop aims to provide a clear understanding of the various roles of a multidisciplinary team in the care and management of stroke patients. We also hope to create awareness of the skills that healthcare professionals require to aid stroke patients in their recovery. A brief overview of the preventive measures and identification of risk factors in stroke will also be covered.



## Workshop 4



### Mindfulness in Healthcare

*Dr Ong Seh Hong, Senior Consultant, Psychological Medicine, Khoo Teck Puat Hospital*

#### ABSTRACT

The workshop will give an overview on mindfulness-based intervention in healthcare and introduces participants to some simple mindfulness practices.

## Workshop 5



### Advance Care Planning (ACP) – Hear My Voice, Respect My Choice

*Ms Sim Lai Kiow, Nurse Clinician; Ms Evon Tay Yi Wen, Executive, Advance Care Planning, Khoo Teck Puat Hospital*

#### ABSTRACT

In this workshop, participants will be empowered with the necessary skills to advocate for Advance Care Planning (ACP) among peers and clients in the community. Participants will learn about the Living Matters ACP framework, enhance their basic communication skills, understand cultural sensitivities and learn to use care planning tools effectively, to empower others to begin their own ACP journey. Case studies of patients who have done ACP with our department will also be shared.

## Workshop 6



### Improving Healthcare Service Delivery via Prescriptive Analytics

*Prof Melvyn Sim, Professor and Provost's Chair, Department of Decision Sciences, NUS Business School, National University of Singapore*

#### ABSTRACT

An efficient, affordable and high-quality healthcare system has always been the focus of the Singapore government. Despite this, the growing demand for healthcare services due to an ageing population has severely impacted the Singapore healthcare system in recent years. This has resulted in a degradation of service, such as patients experiencing unbearable waiting times and severe shortages of beds in some public hospitals. Among other measures, the Singapore government has been tackling the current crunch in public hospitals by building more hospitals and increasing bed capacity. However, apart from increasing the capacity, there are opportunities for using advanced analytics for alleviating and improving healthcare service delivery. Prescriptive analytics focuses on finding the best course of action for a given situation using scientific techniques, such as mathematical optimisation, stochastic analysis and game theory. This workshop will briefly introduce prescriptive analytics and show how it can be used to improve healthcare service delivery, such as managing patients' flow at the accident and emergency department and reducing waiting times for hospital beds.

## Day 1: Plenary Lecture 1

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### A Vision for Promoting Health and Achieving Health Equity

*Dr R D Ravindran, Chairman, Aravind Eye Care System, Madurai, India*

#### ABSTRACT

As Chairman of Aravind Eye Care System since 2010, the speaker will share his experience and vision in the provision of cost-efficient care via process redesign using Aravind's practices in standardising quality eye care. He will talk about his healthcare leadership journey in extending Aravind Eye Hospital's expertise and influence beyond the organisation and how it built capabilities in other eye hospitals in India. The speaker will also share insights into the extent of community engagements developed by Aravind in order to influence and change the way healthcare is delivered in India and worldwide.

## Day 1: Symposium 1 – Shifting Paradigms for Population

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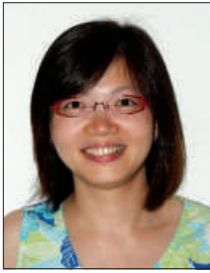


### Forecasting the Future Burden of Diseases in Singapore

*A/Prof Alex Cook, Associate Professor, Saw Swee Hock School of Public Health, National University of Singapore*

#### ABSTRACT

Singapore is ageing rapidly, and as it greys, it will experience a greater burden on its healthcare system due to age-related chronic diseases. Its population is also increasingly sedentary and overweight, compounding the impact of ageing. With its ethnic structure corresponding to three major population groups in Asia (South, South East and East Asians) and its current stage of development, Singapore serves as a canary bird for the problems that will face the world's largest continent as it undergoes the epidemiological transition from infectious to non-communicable diseases. Computational demographic modelling, married with epidemiological knowledge on evolving risk factors, can permit projections of how the burden of diseases, such as diabetes mellitus and its complications, will evolve under various scenarios – including the continuing development of the status quo. In this presentation, I will discuss methods of forecasting disease burden and give examples from my team's research on the burden of chronic diseases, such as diabetes mellitus, in Singapore.



## Health Screening in Singapore

*Ms Christine Fock, Deputy Director, Screening Policy and Planning Department, Regional Health and Community Outreach Division, Health Promotion Board*

### ABSTRACT

Cardiovascular diseases are the leading cause of disability and death in Singapore. Early detection through regular health screening and follow-up is important in keeping residents healthy, especially in an ageing society. In 2008, the Health Promotion Board introduced 'Screen for Life', a population-wide subsidised health screening programme aimed to encourage Singapore citizens and permanent residents aged 40 years and older to undergo screening for obesity, high blood pressure, diabetes mellitus and lipid disorders at participating Community Health Assist Scheme general practitioner clinics island-wide.

In the past three years, the screening coverage for chronic diseases has been high at the national level: 63.5% of residents had a diabetes mellitus screening and 61.2% had a high blood cholesterol screening; 70.8% of the population also had a high blood pressure screening in the past year (based on the National Health Survey 2010 report). Nevertheless, several key challenges still need to be addressed. These challenges include ensuring that residents with abnormal screening outcomes are followed up and getting residents to go for regular health screening. This presentation highlights the current screening landscape, key lessons learnt and potential areas to strengthen chronic disease screening and follow-up efforts in Singapore.



## Population Health in the North

*Session Chair and Speaker*

*Dr Michael Wong Tack Keong, Head and Senior Consultant, Family and Community Medicine, Khoo Teck Puat Hospital*

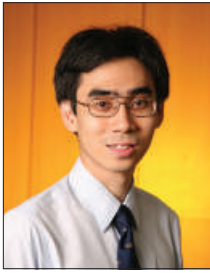
### ABSTRACT

Singapore faces a growing burden of chronic diseases arising from longevity and urban lifestyles. Alexandra Health, a healthcare cluster serving 700,000 residents with its anchoring Khoo Teck Puat Hospital (KTPH), introduced its population health approach in 2013 to engage and empower residents to cope with their ailments sustainably. The speaker will share his team's experiences and lessons learnt.

The population health approach entails: (1) systematic screening at the workplace on weekdays and within residential zones on weekends; (2) population stratification by health and habit patterns; (3) healthy lifestyle change programmes, e.g. the Mini Medical School@KTPH and health promotion workshops; (4) community nurse management of residents with abnormal results; and (5) tools such as data analytics, design thinking, behavioural economics and field IT support.

As the first local health-promoting hospital, KTPH encourages healthy choices through role modelling, nudge principles, stealth exercise and choice architecture, and collaborates with agencies to influence a community infrastructure that supports healthy living. Over 15,000 residents were screened in the last 36 months. Among the lessons learnt were: reformatting report collection to leverage on social norms increased collection from 60% to 85%; and contextualised health messages during result collection increased participation in our change programmes. Furthermore, over 75% of those with abnormal screening results acted on the advice to visit a doctor. Mini Medical School@KTPH has attracted about 1,000 participants and many reported a positive impact on their health.

Our findings confirmed that traditional health promotion methods failed to influence lifestyle changes because of competing information channels. Modern enablers for residents to adopt change and new care routines include goal setting, progress tracking and feedback, gentle nudges, and leveraging on social norms and networks. Improving health and reducing healthcare inequities are shared responsibilities among healthcare professionals and other groups not normally associated with health, but whose participation has an impact on health and the factors influencing it.



## Integration of Healthcare Partners and Resources in the Community: a Promising Vision

*A/Prof Philip Yap Lin Kiat, Senior Consultant and Director, Geriatric Centre, Khoo Teck Puat Hospital*

### ABSTRACT

Dementia has been described as the chronic disease of the 21st century. The chronic, progressive and protracted course of dementia, which affects the mental, physical and functional faculties of a person, and exerts significant social and financial toll on families, challenges the limits of health and social care systems to care well. The majority of patients with dementia also suffer from multiple comorbid conditions, making it a challenge to provide comprehensive care. CARITAS iCommunity@North endeavours to provide holistic, person-centred and transdisciplinary care for persons with dementia and their families across care settings. The talk will cover the aims and operations of CARITAS and share some challenges faced in its implementation. Indeed, to borrow a quote from an editorial in the *Lancet*: "if we can get services right for dementia, then we will be a long way towards getting them right for all individuals with complex and long-term disorders."

## Day 1: Breakout Sessions

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### Session 1



## Organising Community Care Teams: the Experience of ComSA in Whampoa

*Ms Peh Kim Choo, Chief, Programmes, Tsao Foundation*

### ABSTRACT

The Community for Successful Ageing (ComSA) project in Whampoa utilises a community-wide, grounds-up approach to develop an integrated care system to enable ageing in place. The lecture will discuss the project's experience in designing and building care teams, both formal and informal, as building blocks in this integrated care system.



## Session 2



### Dying with Dignity

*Ms Yau Sew Peng, Senior Staff Nurse, Geriatric Clinic, Palliative Care; Ms Tan Seng Wah, Advance Care Planning Facilitator, Advance Care Planning, Khoo Teck Puat Hospital*

#### ABSTRACT

##### Part I

In the face of a rapidly ageing population across Asia, we are well equipped with medical advances to prevent and treat illnesses, and even prolong life, sometimes at the expense of the comfort and preferences of our patients. What is appropriate and how much do we need to equip ourselves to prepare for mortality – our own and the ones closest to us? We will take an intimate look into the healthcare and personal experiences of our patients, and explore the emotion-laden issues related to end-of-life care. Are we, as healthcare professionals, able to define a good death and ensure dignity for our patients till the end?

##### Part II

*“... Oh, leave these (medical) jargons, and go your way straight to God’s work, in simplicity and singleness of heart.” – Florence Nightingale*

Many of us are familiar with the biopsychosocial model of healthcare approach in the care for our clients. However, it lacks the spiritual care dimension to make it a holistic approach to care. Hence, this could undermine the primary mission of medicine and healthcare – to serve the whole person with care and compassion. Even though many would agree that spirituality is a source of comfort and direction in life, some would choose to ignore or discount this, as it is thought that professional care providers should not address the spiritual aspect of care. Moreover, some may also opine that they are not equipped to do so.

What do you think? We will revisit this area of nursing and ask ourselves the relevance of spirituality in healthcare, particularly in end-of-life care.

## Session 3



### The Future of Health Promotion

*Ms Vasuki Utravathy, Deputy Director, Strategic Planning and Collaborations, Health Promotion Board*

#### ABSTRACT

Health is a basic human need, fundamental to the successful functioning of individuals and societies. Health is influenced by people’s cultural, social, economic and environmental conditions, which in turn influence social and personal behaviour. Health promotion aims to empower people to control their own health by gaining control over these underlying factors that influence health. These days, problems such as obesity, antimicrobial resistance, health disparities, coupled with health-literate consumers, technology, commercialisation and globalisation, are significantly influencing systems and entities that promote health. Set against this background, this presentation will explore how health promotion professionals should take into account these emerging trends and adjust our approach to reach out to Singaporeans. It will also explore the relevance of the Ottawa Charter in Singapore in the 21st century.

## Session 4



### Hospitals and Healthcare Systems of the Future

*Dr Terence Tang Eng Yeow, Deputy Chairman, Medical Board (Care Integration), Head and Senior Consultant, Geriatric Medicine, Khoo Teck Puat Hospital; Dr Ng Yeuk Fan, Deputy Director, Special Projects, Alexandra Health System*

#### ABSTRACT

The speakers will share with participants the experiences drawn from the Alexandra Health System Transformation 2020 journey and lead participants in a discussion of what might be a possible model of care and service model for regional health systems in Singapore. They will also explore concepts of systematic health and healthcare services designed for the future.

## Day 1: Plenary Lecture 2

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### Nursing the Community: Needs and Challenges

*Dr Lina Ma Yee Sheung, Director, Clinical/Aged Care Services, Lions Home for the Elders*

#### ABSTRACT

Community can be defined as individuals or groups of people who share similar environments, concerns and resources. Nursing the community is about delivering quality, accessibility and affordability of healthcare services when the community needs it. It is also about developing partnership in the community to achieve outcomes that are beneficial to those who serve and those who are being served. Current healthcare policy has emphasised the importance of supporting innovation and change within the community services despite the many hurdles that need to be overcome. Moreover, community care has become more complex, as care shifts from hospital to the community in response to the policymakers and changing patterns of healthcare models. Therefore, nursing the community requires a clear, shared vision and time in order for a real change to happen at grassroots level. No doubt, many additional needs, opportunities and challenges will present themselves and require different ways of working now and in the future.

## Day 2: Symposium 2: Collaborative Care – Silos to Synergy

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### Disciplinary to Transdisciplinary Care

*Session Chair and Speaker*

*A/Prof Tan Kok Yang, Head and Senior Consultant, General Surgery, Khoo Teck Puat Hospital*

#### ABSTRACT

The delivery of surgical care has become increasingly complex, especially in recent years. There have been massive developments in surgical options, all with more complex decision-making processes. Thus, there is a need for healthcare professionals to delve deeper into their areas of expertise, which leads to subspecialisation. There is also an increasing dependence on other subspecialists with other domain expertise in the care of a single patient. Yet, there is an overwhelming need for every patient to be considered as a whole and not just in terms of organ systems or specific pathologies. There is now a discrepancy between the comprehensive care that every patient wants and the ability of a single healthcare professional to deliver such care.

Globally, we are seeing the rise of what has been termed the 'silver tsunami'. This is where an increasingly ageing population poses issues, such as workforce economics and healthcare demands. This change in the population demographic means that the patient population managed by the surgical team will become even more challenging. There are many other factors that have to be considered if one aspires to deliver comprehensive care. As such, it is essential for hospitals and healthcare professionals to re-examine the way they manage surgical patients, giving special emphasis to the complexities of their socioeconomic, functional and health statuses. In this talk, the speaker will discuss the factors that pose challenges to the delivery of comprehensive surgical care and ways in which healthcare professionals can adapt to deliver more comprehensive care.



### Integrating and Improving Chronic Disease Management: Diabetes Mellitus

*A/Prof Subramaniam Tavintharan, Head and Senior Consultant, Diabetes Centre, Khoo Teck Puat Hospital*

#### ABSTRACT

Diabetes mellitus is a multifactorial, heterogeneous chronic disease. Poorly controlled diabetes mellitus often leads to increased risk for cardiovascular disease, blindness, kidney failure and lower extremities amputations. Besides pharmacological treatment, successful management of diabetes mellitus requires patients to develop desirable lifestyle habits, including exercise and healthy dietary choices, to preserve health and retard organ damage. This requires the involvement of activated patients and their caregivers in their own care plans, as well as integrating and working closely with a multidisciplinary team to collaboratively manage the different aspects of diabetes mellitus seamlessly for the patient. This talk will outline and discuss approaches to integrating care for patients with metabolic diseases using diabetes mellitus as a model.



## Eight Ideas in Organising Collaborative Care in the Tertiary Hospital

*A/Prof Thomas Lew Wing Kit, Chairman of Medical Board, Tan Tock Seng Hospital*

### ABSTRACT

One of the key questions confronting the operational effectiveness of acute care hospitals is its relevance and role in the care transformation agenda for Singapore's future healthcare system. The triple challenges of Singapore healthcare has been restated many times: (1) the fiscal and manpower constraints; (2) overcoming the medicosocial problems of the ageing population segment – its increasing isolation and institutionalisation; and (3) the effective management of the burden of chronic diseases by prevention and primary holistic care. These challenges raise the spectre that acute hospitals and their huge draw of healthcare resources to date represents an inflated and wasteful elephant in the room.

Does it? This presentation provides an overview of the depth and mission scope of acute hospitals' roles and how fulfilling these roles require a relook at collaboration and integration of processes and providers. It also offers some perspectives from Tan Tock Seng Hospital on (1) structuring the hospital care delivery organisation; (2) providing clarity on the mission model; (3) testing collaborative models as illustrated by (4) nurse-led services and (5) tackling the big piece on regional health systems networks; (6) learning from others; (7) developing an effective internal engagement model; and (8) embedding empathy and ethos in the overall plan of action.



## Ambulatory Care: Team-Based Approaches

*Dr Ng Wei Liang David, Family Physician, Associate Consultant and Clinic Head, Toa Payoh Polyclinic, National Healthcare Group Polyclinics (NHGP)*

### ABSTRACT

Comprehensive, coordinated and personalised care is part of the key values of the practice of family medicine. The combination of multiple clinical practice guidelines, a wide spectrum of diseases and complexities in the patients under our care, and the desire for continuing primary care based on trust makes care delivery in a doctor-centric medical model (which has characterised our healthcare system) increasingly challenging.

Many health systems worldwide are moving toward delivering medical care as a team. This talk aims to share the need for a move toward team-based care delivery, international perspectives on team-based care and the initial outcomes of a team-based care pilot in a polyclinic setting, and demonstrate the advantages of a different method of care delivery in Singapore.

## Day 2: Symposium 3: Shifting Paradigm in Healthcare – Past, Present and Future

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*Session Chair*

*Dr Benjamin Lam Chih Chiang, Consultant, Family and Community Medicine, Khoo Teck Puat Hospital*





## Better Health, Better Care, Better Life

*A/Prof Kenneth Mak Seck Wai, Deputy Director Medical Services, Health Services Group, Ministry of Health*

### ABSTRACT

Healthcare professionals in Singapore are faced with many significant challenges, namely an increasing healthcare demand by an expanding and ageing population, the rising cost of healthcare and an increasing need to deal with more complex medical conditions.

In this talk, the speaker will give an overview of the changes that are currently being implemented to transform our healthcare system into a more sustainable, patient-centric and community-based care model. This is a paradigm shift that refocuses care from simply treating illness to maintaining health. Family physicians will play an important role in anchoring this new model in the community, with better coordination of care across different care settings.



## The Evolution of Community Care and Ageing Population

*A/Prof Pang Weng Sun, Chairman of Medical Board, Yishun Community Hospital*

### ABSTRACT

In the 1980s, Singapore saw the need to develop eldercare services in anticipation of an ageing population. Measures such as the establishment of geriatric medicine departments and the development of nursing and allied health professionals were put in place to develop a healthcare workforce that is trained in eldercare. Various models of eldercare in the community were introduced jointly with non-government organisations, and funding mechanisms were explored. Today, these services and funding models are still evolving. In this talk, the speaker will summarise key developments in the past two to three decades and present proposals for the way forward.



## Acute Care and Hospital Care – Future and Challenges

*A/Prof Pek Wee Yang, Chairman of Medical Board, Khoo Teck Puat Hospital*

### ABSTRACT

The rapidly ageing population in Singapore and the shift in disease burden toward chronic diseases will predictably cause an increasing demand in the delivery of quality acute care in an accessible and affordable manner. The current hospital-centric way of delivering episodic care is becoming increasingly less effective in the population we are serving. We have to adapt to this changing environment and reinvent ourselves as acute care providers.



## The Evolution of Medical Education

*Prof C Rajasoorya, Senior Consultant, General Medicine, Khoo Teck Puat Hospital*

### ABSTRACT

The three buttresses of the healthcare 'tripod' are patient care, research and education. The ultimate goal of medical education is to produce doctors and specialists with competencies and skills that meet reasonable patient expectations within a healthcare framework. Historically, medical education originated from the Greeks, who introduced the method of rational inquiry by the practice of observation and reasoning regarding disease. The interpretation and discussion led to teachings and subsequently, the formation of medical schools. Colonial powers brought western medicine to Asia and the first medical school was established in Singapore in 1905. Abraham Flexner, who was from the United States, brought a new conceptual model, which highlighted prerequisites for medical schools, a solid grounding of training in sciences and a structured clinical rotation. Over the years, medical education highlighted not only the importance of knowledge, but also its application and independent practice in a professional and compassionate manner. Among the changes that are sweeping the medicine discipline include evolving disease patterns, explosive knowledge, information technology, societal expectations, and changing professional roles and boundaries. Medical education has advanced in tandem with educational strategies that incorporate newer teaching methodology, and content and knowledge assessment techniques. Medical education has moved away from being teacher-centred, information-oriented, discipline- and hospital-based, uniformed and opportunistic to being student-centred, problem-based, interprofessional, community-based, systemic and structured.

## Day 2: Breakout Sessions

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### Session 5



## Trauma Care: Evolving Trends and Improving Outcomes

*Dr Chiu Ming Terk, Senior Consultant, Head of General Surgery and Director of Trauma, Tan Tock Seng Hospital*

### ABSTRACT

Trauma is a global disease that affects both poverty-stricken, war-ravaged countries and developed, urbanised nations. In the quest for better outcomes, the management of trauma has evolved through the years, from systems development to management concepts.

In this lecture, I will share the following developing trends:

1. Effective trauma management is about systems: trauma systems exist at several levels – national, hospital and departmental. Optimisation of trauma systems minimises time to holistic care for trauma patients, and timely management is key to a good outcome. I will discuss how a good trauma system at various levels impacts outcomes.
2. Simplicity is better at saving lives: trauma management concepts have gone from encompassing complex surgeries to simple, abbreviated procedures. I will discuss non-operative and damage control concepts.
3. Standardisation of management leads to better outcomes: standardisation of best practices leads to uniformly better outcomes. I will talk about trauma protocols and trauma training.

## Session 6



### Geriatric Surgical Service Model

#### *Session Chair and Speaker*

*Adj Asst Prof Surendra Kumar Mantoo, Consultant, General Surgery, Khoo Teck Puat Hospital*

#### *Co-speakers*

*Adj Asst Prof Sim Hsien Lin, Consultant, General Surgery; Dr Geraldine Cheong, Consultant, Anaesthesia; Ms Phyllis Tan Xiuzhuang, Nurse Clinician, Nursing Administration; Mr Sunny Tan Boon Chai, Physiotherapist, Rehabilitation Services, Khoo Teck Puat Hospital*

#### **ABSTRACT**

As Singapore faces an ageing population, surgeons now have to treat an increasing number of elderly patients. Management of elderly surgical patients is complex owing to a higher incidence of comorbidities and reduced functional reserves. Many of these complexities go beyond the boundaries of the surgeon's expertise and thus a team-based approach must take precedence. In our hospital, octogenarians (patients older than 75 years old) who require major colorectal surgery are managed by the Geriatric Surgery Service (GSS). The GSS employs a transdisciplinary collaborative model of care. Based on our previous results, implementation of this model has achieved lower mortality and lower major complication rates. The majority (84.6%) of patients managed by the GSS returned to preoperative functional status within six weeks.

Through the presentation of a few case studies, the roles of specialists, nurses and allied health professionals in the transdisciplinary model of care of elderly surgical patients will be discussed.

## Session 7



### Patient-Centred Integrative Rehabilitation Service

*Mr Adon Chan Hock Kiong, Principal Physiotherapist, Rehabilitation Services, Yishun Community Hospital*

#### **ABSTRACT**

Integrative medicine is a relatively new holistic concept of the healthcare movement within hospitals and medical schools. Designed to treat the person, and not just the disease, integrative medicine's approach has been described to heal the mind, body and spirit all at the same time. In modern rehabilitative care, recognition of the patient as a social entity has necessitated the use of complementary strategies alongside conventional clinical therapy treatments. Through the presentation of case studies, the importance of a holistic framework for clinical decision-making in integrative, person-centred rehabilitative care will be highlighted in this talk.

## Session 8



### Empowering Patients

*Dr Chan Keen Loong, Senior Consultant and Head of Department, Psychological Medicine, and Project Director, THRIVE, Psychological Medicine, Khoo Teck Puat Hospital*

#### ABSTRACT

Patient empowerment is defined by the World Health Organization as “a process through which patients gain greater control over decisions and actions affecting their health.” In order to achieve this, patients need to be provided with the necessary knowledge, skills and techniques for managing their health. Reframing health issues, enhancing motivation and providing suitable role models are important components. Ongoing support, encouragement and monitoring are equally vital, especially in the initial stages. The speaker will discuss the components of patient empowerment, with a case illustration.

## Day 2: Symposium 4: Collaborative Care – Silos to Synergy

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### Transcending Care Across Settings: AHS Hip Fracture Service

*Session Chair and Speaker*

*Dr Mallya Ullal Jagadish, Senior Consultant, Geriatric Medicine, Khoo Teck Puat Hospital*

#### ABSTRACT

Hip fracture is a very common fragility fracture in the elderly and is a major public health concern. Annually, nearly 2,500 hip fractures occur in Singapore and the number of cases is expected to increase with an ageing population. Hip fracture is a significant life-changing condition. Surgery is associated with a mortality rate of approximately 1%–5%, and in one year, about 20% of patients with hip fractures are expected to not survive. Hip fracture is also a major cause of loss of independence and is associated with economic consequences for patients and their families, and the healthcare system. Despite well-established standards, delivery of care remains fragmented. Khoo Teck Puat Hospital's Integrated Hip Fracture Unit has shown that coordinated care is associated with better outcomes for patients, with a reduction in postoperative complications and mortality.



### Polypharmacy

*Mr Tan Jianming, Senior Pharmacist, Pharmacy, Khoo Teck Puat Hospital*

#### ABSTRACT

Polypharmacy is a feature of modern medicine, with its numerous guidelines, specialties and subspecialties. Compounded with our ageing population, polypharmacy is a problem that is here to stay. Project Cutapiller is a project initiated by Khoo Teck Puat's Pharmacy Department to promote the rational use of medications in a bid to reduce the occurrence of polypharmacy.

Project Cutapiller is currently in its third year of implementation and has had multiple hospital-wide presentations to the various clinical departments. Following our interactions with world-leading experts in the area of deprescribing and the various initiatives that have been introduced to the clinical teams to imbibe the concept of deprescribing, the speaker will share some of the Project Cutapiller team's successes and failures in the three years and also provide some guidance to other hospitals that wish to initiate their own deprescribing movement.



## Transdisciplinary Cancer Care

*A/Prof Simon Ong Yew Kuang, Senior Consultant, Division of Medical Oncology, National Cancer Centre Singapore*

### ABSTRACT

In this talk, the speaker will share about the challenges of shared care between institutions in the delivery of care for cancer patients, based on his personal experiences.



## Coordinated Health and Social Care: What Would It Take to Really Make It Happen?

*Ms Han Yah Yee, Group Director, Social Services, Montfort Care*

### ABSTRACT

An elderly patient may present with multiple problems, such as mental health, chronic illness, poverty and poor familial relationship. More than one discipline is required in order to contribute to the solution for the myriad problems. A coordinated health and social care service is needed to help the elderly age in place and the family to attain stability and function.

In this lecture, the speaker will share key principles and ideas on how to make coordinated health and social care happen. She will share lessons learnt as well as examples from the organisation's community programmes. Opportunities will be given for participants to generate ideas and share good practices from their respective institutions, to enrich learning among the participants.

## Day 2: Panel Discussion 1

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## Teaming Up with Patients, Families and Community to Improve Healthcare

*Session Chair and Speaker*

*Ms Shirley Heng, Deputy Director, Nursing, Nursing Administration, Khoo Teck Puat Hospital*

*Co-speakers*

*Mrs Chew Kwee Tiang, Chief Executive Officer, Khoo Teck Puat Hospital; Dr Pauline Tan, Chief Executive Officer, Yishun Community Hospital; Dr Wong Sweet Fun, Chief Transformation Officer, Alexandra Health System, Deputy Chairman, Medical Board, Yishun Community Hospital and Senior Consultant, Geriatric Medicine, Khoo Teck Puat Hospital*

### ABSTRACT

The speakers, who are senior leaders of Alexandra Health System, will share their insights and perspectives on how healthcare professionals can continue to support patients and their families in maintaining health and managing illness. Against a backdrop of escalating healthcare costs and complexity of care delivery, and a growing population that is better informed, it is inevitable that healthcare professionals need to effectively engage families, community partners and volunteers to optimise care for patients. This session will explore how collaborative care can be delivered and optimised with involvements from non-professionals, as well as paradigm change in how care can be best delivered.



## Day 3: Breakout Sessions

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### Session 9



#### Healthcare for the Future: Shifting Paradigms for Professionals (Nurturing Healthcare Workforce for Better Healthcare)

*Adj A/Prof Tham Kum Ying, Education Director and Senior Consultant, Pre-Professional Education Office and Emergency Department, Tan Tock Seng Hospital*

#### ABSTRACT

Every health profession school has a curriculum that specifies what is taught to students, as well as when, where, how and by who. Whether the new graduate from the health profession school is fit for purpose, i.e. ready for work, is an important consideration when planning and reviewing the curriculum. However, the curriculum and school also have other needs to meet. This talk will use case studies to illustrate the demands placed on the curriculum and school, and the delicate balance it needs to achieve.

The other topic that will be explored is the gap between needs and expectations of the public. Health profession schools and healthcare institutions train students and healthcare professionals to meet needs that have been defined by patient characteristics and population characteristics. Meeting such defined needs and the expectations of the public, however, can be two different matters. Again, this issue will be discussed using case studies. The talk will conclude with some pointers for the way forward.

### Session 10



#### Shifting Paradigm in Geriatric Care: Ageing without Dementia

*A/Prof Ng Tze Pin, Research Director, Gerontological Research Programme, Department of Psychological Medicine, Yong Loo Lin School of Medicine, National University of Singapore*

#### ABSTRACT

Dementia presents a daunting challenge and burden to ageing persons and their caregivers, and healthcare and social service systems. With no cure in sight, treatments are shifting toward targeting early dementia and pre-dementia (mild cognitive impairment). Possible strategies include slowing cognitive decline by modifying the underlying Alzheimer's disease and cardiovascular pathological process, and/or increasing brain and cognitive reserve to create surplus buffering capacity against the early onset of dementia symptoms.

Lifetime risk and protective factors associated with the risk of developing dementia include:

Genetic: APOE-e4 genotype; Sociodemographic: age, ethnicity, low education; Lifestyle: physical activity; Social engagement: living alone, loneliness, marital status, active work employment; Cognitive-stimulating activities; Psychological: stress, depression; Medical: medical conditions and drugs; Cardiometabolic and vascular: obesity, hypertension, diabetes mellitus, insulin resistance, metabolic syndrome; Frailty; and Nutritional: malnutrition, folate, B<sub>12</sub>, omega-3 PUFA, tea, curcumin, etc.

These factors will be addressed in this presentation using data from the Singapore Longitudinal Ageing Studies to illustrate how we can help people to age without dementia.



## Genomic Medicine for Clinicians – Ready to Shift Paradigm?

*A/Prof Lim Su Chi, Clinical Director, Clinical Research Unit, Khoo Teck Puat Hospital*

### ABSTRACT

The human genome project has paved the way for genomic medicine. Genomic medicine is broadly defined as the use of genetic information in clinical medicine for the diagnosis, prognosis, prevention and treatment of disease. It also often sheds light on disease pathobiology.

While largely imperceptible to the practising clinician, genomic medicine has ushered in a new era in medicine, which promises to revolutionise healthcare, slowly but surely, just like the Internet. In the words of Dr Roy Amara, President of the Institute for the Future: “We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run.” One day, our young clinicians will struggle to imagine the nature of medicine in the antediluvian era before the flood of genomic data.

## Session 11



## Professionalism and Ethics

*Dr Lawrence Tan Wei Meng, Senior Consultant, Geriatric Medicine, Khoo Teck Puat Hospital*

### ABSTRACT

The objectives of this session include: (1) defining medical professionalism – what is it?; (2) knowing the importance of medical professionalism; (3) recognising professional and unprofessional behaviours in healthcare professionals; (4) learning about the obligations and responsibilities of healthcare professionals; and (5) understanding the principles of clinical ethics and their application in real life.

## Session 12



## Embarking on “The Scorch Trials” for Healthcare Education through Games-based Learning

*Dr Kevin Yap Yi-Lwern, Lecturer, Department of Pharmacy, Faculty of Science, National University of Singapore (NUS), Designated Champion, Health IT Master Plan Capability Planning Project, Ministry of Health and NUS Representative, National Pharmacy Strategy Project Team*

### ABSTRACT

The Generation Y healthcare students are technology-savvy and digitally focused. Our educators have a constant challenge with finding innovative approaches to sustain students’ interests in their modules, encourage peer learning and improve clinical practice skills. Furthermore, students face the challenge of not being able to integrate and apply what they have learnt to real-life practices. Serious games can combine both learning and gaming strategies to solve problems and carry out game tasks, thus making it an effective learning tool.

In September 2015, a movie based on a planned trilogy called “The Maze Runner: The Scorch Trials” won the box office with an estimated USD 30.3 million. In this movie, a group of teenagers who were trapped in a mysterious labyrinth escaped only to find themselves in an even more dangerous, post-apocalyptic world. Uncertain who to trust after making their way out of the maze, the survivors found themselves on the run again in a ravaged world full of new and terrifying threats. In an exploration to create a magical world for students to learn about medications management in a fun yet engaging manner, we developed an in-house, pharmacy-related serious game where students played the game as pharmacist avatars to solve a ‘mystery’ in a futuristic, post-apocalyptic world. This presentation will describe the students’ experiences as they embarked on this magical adventure, and how “The Scorch Trials” can create an authentic learning experience.

## Session 13



### Continuing Professional Nursing Education – More than a Programme

*Dr Ann Marie Rice, Senior University Teacher, Deputy Head, Nursing and Health Care School, University of Glasgow*

#### ABSTRACT

This session will explore the importance of continuing professional development (CPD) in nursing and its relationship to both the provision of quality person-centred care and the development of nursing as a profession. There will also be a discussion on the variety of ways in which CPD activities can be undertaken, and the barriers and facilitators to achieving this.

## Day 3: Symposium 5 – Shifting Paradigms for Professionals

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*Session Chair*

*A/Prof Sum Chee Fang, Senior Consultant, Diabetes Centre, Khoo Teck Puat Hospital*



### Family Medicine Training Vision for Singapore Today and Tomorrow: Mainstreaming a Paradigm Shift

*A/Prof Goh Lee Gan, Professorial Fellow, Division of Family Medicine, Department of Medicine, National University Health System*

#### ABSTRACT

In 2014, the Division of Family Medicine, NUHS, reflected on the training vision of Family Medicine in Singapore, from the inception of the Family Medicine movement in 1971 by the College of Family Physicians, Singapore, to the adoption of Family Medicine as a formal academic discipline in the then University of Singapore in 1987, and beyond. Today, Family Medicine is taught in the undergraduate and postgraduate vocational training programme, which leads to the award of the Graduate Diploma in Family Medicine (GDFM) and MMed(Fam Med), and the finishing school of the College of Family Physician Fellowship Programme.

Family Medicine is in the MOH Residency Programme since 2011. 43 years on (1971 to 2014), Family Medicine has made a paradigm shift from “Primary care in the community” to “Family Medicine as one discipline in many settings”. The continued mainstreaming of this paradigm shift is necessary to meet the needs of the changing healthcare landscape in Singapore. This presentation will examine the training vision that will effectively respond to the three fundamental drivers of change in the healthcare landscape: (1) the rise in chronic non-communicable diseases; (2) the increase in life expectancies reaching 100 years; and (3) the need to serve an ever-growing population. Training the public on the effective use of the nation’s preventive, acute, continuing and long-term care is part of the training vision. The motivation of doctors to choose Family Medicine as it promises a rewarding and meaningful career is an important outcome of the training vision.



## New Nursing Professional: What Matters Most?

*Ms Low Beng Hoi, Chief Nurse, Alexandra Health System*

### ABSTRACT

Professionals can be defined as individuals who display competency and skills in alignment with the profession. Most of the origin of the nursing profession sprung from the influence of Ms Florence Nightingale, known as 'The Lady with the Lamp', who stood for care and concern, a foundation still embraced in the discipline today. Ms Nightingale was ahead of her time, going above and beyond basic care to address environmental cleanliness and ways to restore humanity (the quality of being human) of wounded soldiers in the Crimean War. One of her many quotes, "Let us never consider ourselves finished nurses...we must be learning all of our lives", is a legacy in nursing, and has been upheld by nursing leaders who have charted and are still charting the roles of past, present and future nursing professionals.

The nursing professional has also witnessed increasing demands by patients for accessible, affordable and quality healthcare at the political, economic and social fronts, especially in the last decade. Currently, most patients present at acute hospitals to be diagnosed, treated and advised, which would inevitably result in over-provision of care and treatment for some. As the population ages and requires different levels of care, the current models of care have to be reviewed. Will the development of new models help to meet the healthcare demands? If care integration is necessary in meeting expectations of a continuum of care, how should healthcare providers (i.e. nurses and doctors), allied health professionals and volunteers provide appropriate and affordable care? Should professionals be practising at the top of their licenses using complementary roles to meet patients' healthcare needs? As it makes sense for the primary care sector to focus on these issues, this will be another area where nursing professionals can prepare themselves to enable patients, families and caregivers in playing a key role in restoring patients' health or caring for end of life.

In the end, patients and their families and caregivers are what matters most. Thus, nurses' knowledge, skills and expertise have to be constantly developed in order for new, complex and sensible roles to be performed. As poignantly summarised at the recent International Council of Nurses, in providing patients' care and managing their well-being, nurses can best influence "cost effective and care effective" models. This is believed to result from the close interactions and heart-to-heart conversations nurses are privileged to have with patients and their families and caregivers.



## Healthcare Management

*Prof Philip Choo Wee Jin, Group Chief Executive Officer, National Healthcare Group*

### ABSTRACT

It is important to know the differences between current and future healthcare systems, and be able to identify from the community, both the upstream and downstream determinants of patients' health conditions, before they get worse. We also need to build options in our current inpatient and outpatient range of services, and to have strong collaboration with partners. Equally important is the need to understand chronic diseases and ageing beyond the traditional medicine model, both upstream and downstream factors, and the current care model.

In this session, we will explore the following options: (a) optimising the deployment of manpower; and (b) applying application system thinking for work efficiency and good employment outcomes.

## Day 3: Plenary Lecture 3

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### Resident Training: Training the Future Medical Professional

*A/Prof Nicholas Chew Wuen Ming, Group Chief Education Officer, Group Education, National Healthcare Group*

#### ABSTRACT

The pedagogical transformation of medical education over the last century since the Flexner Report has resulted in what may be termed a 'golden age', where innovative, theoretically grounded teaching methods, competency-based learning, continual multidimensional assessments are the norm in physician training. However, some have charged that one important aspect of this post-Flexnerian legacy is in need of reform – the individualistic, physician expert-centric culture, which now runs counter to the collaboration and integration needed in a highly networked, team-based, complex healthcare system. It is clear that what is required is not just additional learning modules or assessment methods, but a fundamental reframing of medical training to impart capabilities relevant to this new healthcare paradigm.

What then are the new skills required by future medical professionals? How do we leverage new technologies and scientific advancements in training professionals for tomorrow's healthcare? How will they influence resident training in Singapore?

The National Healthcare Group Education Office, in consultation with educators and healthcare practitioners in Singapore, has devised a model that encapsulates the important attributes required of a professional for tomorrow's healthcare (PTH). These attributes encompassed in the PTH model include ethics and professionalism, core and cross-cutting capabilities, future-oriented thinking and distributed leadership. The model functions as a conceptual framework upon which competencies can be contextualised according to various residency programmes and customised according to the local healthcare setting.



## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS001

## Genomic medicine in diabetes mellitus: whole exome sequencing as a tool for identifying novel genetic variants responsible for monogenic diabetes mellitus in a pedigree study

Ang SF<sup>1</sup>, Hoi Q<sup>1</sup>, Tan HH<sup>2</sup>, Fong CWJ<sup>1</sup>, Tan SHC<sup>1</sup>, Sylvia<sup>1</sup>, Gurung RL<sup>1</sup>, Lim SC<sup>1,2</sup><sup>1</sup>Clinical Research Unit, <sup>2</sup>Diabetes Centre, Khoo Teck Puat Hospital, Singapore

**INTRODUCTION** Maturity onset diabetes of the young (MODY), a form of monogenic diabetes mellitus, accounts for approximately 5% of the population with early onset diabetes mellitus. An accurate genetic diagnosis of monogenic diabetes mellitus is important for prognosis, treatment and genetic counselling. Two siblings were recruited for targeted resequencing/genotyping of 17 candidate genes that are implicated in monogenic diabetes mellitus based on their strong MODY-like clinical phenotypes. However, no potential causal variants (based on the American College of Medical Genetics' recommended criteria) were found, i.e. the probands were considered to be MODY-X. Therefore, the search for variants was expanded to the exome level for the two siblings and their three other family members using whole exome sequencing (WES).

**METHODS** Targeted resequencing/genotyping was performed using the Ion Personal Genome Machine™ and TaqMan® Assay. WES was performed using Illumina NextSeq. Demultiplexing was performed

using the Bcl2FastQ conversion software and reads were mapped to reference human genome (hg19) with Burrows-Wheeler Alignment, followed by marking of duplicate reads with Picard tools. Variants were called using GATK HaplotypeCaller, annotated using Variant Effect Predictor and filtered using GEMINI. Pedigree analysis pipeline (inheritance pattern filter) was applied to identify novel deleterious variants that were shared among affected family members but absent in unaffected counterparts.

**RESULTS** WES revealed protein tyrosine phosphatase 1B (PTPN1) Lys150Glu as a missense variant that exhibits pedigree segregation. PTPN1 inhibits insulin signalling and is implicated in type 2 diabetes mellitus. The mutation occurs at the catalytic domain and is likely to be activating to cause diabetes mellitus.

**CONCLUSION** WES is a useful method for identifying variants in novel genes in monogenic diabetes mellitus, provided that the family pedigree is available.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS002

## Elevated plasma leucine-rich alpha-2-glycoprotein 1 is associated with diabetic retinopathy in Asians with type 2 diabetes mellitus

Goenadi CJ<sup>1</sup>, Zhang X<sup>2</sup>, Pek S<sup>2</sup>, Tavintharan S<sup>3</sup>, Sum CF<sup>3</sup>, Lim SC<sup>3</sup>, Yip CC<sup>1</sup>, Neelam K<sup>1</sup><sup>1</sup>Department of Ophthalmology and Visual Sciences, <sup>2</sup>Clinical Research Unit, <sup>3</sup>Diabetes Centre, Khoo Teck Puat Hospital, Singapore

**INTRODUCTION** Leucine-rich alpha-2-glycoprotein 1 (LRG1) is a novel angiogenic factor that promotes angiogenesis, a key feature of diabetic retinopathy (DR), by modulating endothelial transforming growth factor-beta signalling. Increased LRG1 was found in the vitreous fluid obtained from patients with proliferative diabetic retinopathy (PDR), as compared to non-PDR patients with epiretinal membrane. We aimed to examine the association of plasma LRG1 level with DR in a multiethnic Asian cohort with type 2 diabetes mellitus (T2DM).

**METHODS** 470 Asians aged 21–90 years with T2DM were included in this cross-sectional study. Plasma level of LRG1 was measured by ELISA kits (Immuno-Biological Laboratories). Digital colour fundus photographs from each participant were assessed for the presence of DR in a masked fashion by a trained ophthalmologist.

**RESULTS** The mean age of the cohort was 53.0 ± 11.7 years and there was a slight preponderance of male participants (58.7%). The presence of DR (non-PDR + PDR) was observed in 187 (39.8%) participants. The median (interquartile range) plasma LRG1 level was significantly higher in DR than non-DR participants (15.0 [11.3–21.1] µg/mL vs. 14.1 [10.6–19.5] µg/mL;  $p < 0.001$ ). In multivariable logistic regression model, 1-unit increase in natural log-transformed LRG1 remained statistically significant with DR (OR 1.96, 95% CI 1.11–3.43;  $p = 0.019$ ).

**CONCLUSION** Higher plasma LRG1 is a significant clinical predictor of DR in a cohort of Asians with T2DM. The causal and temporal relationships of LRG1 and DR need to be explored in future prospective studies.

## CATEGORY: CLINICAL RESEARCH (ALLIED HEALTH)

AHF16CA001

## Use of cognitive enhancers in Khoo Teck Puat Hospital memory clinic: a retrospective study

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**INTRODUCTION** Extant literature posits that only 30% of people with dementia receive cognitive enhancers. This study aimed to evaluate the use of cognitive enhancers in a tertiary hospital dementia service and to investigate why some patients are not prescribed cognitive enhancers.

**METHODS** Patients seen in a tertiary hospital dementia service between April 2007 and August 2014 were included in the study. Those whose case or medication records were irretrievable and those who were not diagnosed with dementia were excluded. The records were reviewed to elicit the reasons for non-prescription, and the reasons were categorised into medical factors (e.g. medical contraindications), social/situational factors (e.g. financial concerns, patient or family refusal), or a combination of both.

**RESULTS** A total of 1,173 patients were recruited, of which 113 were excluded. A total of 336 (31.7%) patients were not prescribed cognitive

enhancers. The reasons comprised medical (19.8%), social/situational (38.6%), a combination of both factors (28.9%) and unknown factors (12.7%). Medical factors included polypharmacy, potential drug interactions, multiple comorbidities and advanced dementia. Social/situational factors included low belief in drug benefits, poor social and financial support, and poor compliance with medication and medical appointments.

**CONCLUSION** Cognitive enhancers were prescribed in 68.3% of the patient sample from a tertiary hospital dementia service, and several factors limited their use. Some factors such as polypharmacy, potential drug interactions, and limited social and financial support are amenable to interventions to increase the likelihood of patients receiving cognitive enhancers. Our study findings can thus enable targeted efforts toward helping more patients reap the benefits of using cognitive enhancers.

## CATEGORY: CLINICAL RESEARCH (NURSING)

AHF16CN001

## Roux-en-Y gastric bypass versus the best medical treatment for type 2 diabetes mellitus with body mass index of 27–32: preliminary result of a randomised controlled trial

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**INTRODUCTION** For patients with type 2 diabetes mellitus (T2DM) who are morbidly obese, significant and durable weight reduction via bariatric surgery results in remission or improvement in T2DM. However, the outcome of surgery is less predictable for those with less severe obesity (i.e. body mass index [BMI] 27–32). Many observational studies have been conducted, but class I evidence is scarce. This study aimed to show that Roux-en-Y gastric bypass (RYGB) is superior to the best medical treatment in reaching well-defined treatment end-points in Asian T2DM patients with a BMI of 27–32, and that T2DM improvement following RYGB results in reduced resource utilisation in medium- to long-term care.

**METHODS** We set out to recruit 40 patients aged 21–65 years with the following: T2DM duration  $\leq 10$  years; haemoglobin A1c (HbA1c) level  $\geq 8\%$ ; BMI of 27–32; and at least one other comorbidity. Patients eligible for the study were randomised to either the medical or RYGB

arm. To date, 19 patients have been randomised. Continuous glucose monitoring (CGM) was conducted on all patients at baseline and six weeks post treatment.

**RESULTS** The longest follow-up to date was two years. Based on our preliminary results, the RYGB group recorded a greater decrease in HbA1c and fasting plasma glucose levels, BMI, weight and waist circumference, as compared to the medical group. In the RYGB group, CGM showed improved glycaemic profile and decreased variability, and improved percentage duration within the target blood glucose range of 4–10 mmol/L. The medical group's overall parameters and CGM showed similar changes, although they were less significant than those in the RYGB group.

**CONCLUSION** Our preliminary results showed that RYGB is better than medical treatment in meeting specific treatment end-points for T2DM patients with less severe obesity.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP002

## Navigating the paradigm of chronic kidney disease in type 2 diabetes mellitus: useful lessons and prediction model based on a 13-year prospective cohort study

Low KMS<sup>1</sup>, Lim SC<sup>1,2</sup>, Zhang X<sup>1</sup>, Yeoh LY<sup>3</sup>, Liu YL<sup>3</sup>, Tavintharan S<sup>2</sup>, Sum CF<sup>2</sup>

<sup>1</sup>Clinical Research Unit, <sup>2</sup>Diabetes Centre, <sup>3</sup>Department of Medicine, Khoo Teck Puat Hospital, Singapore

**INTRODUCTION** Chronic kidney disease (CKD) is a major complication of type 2 diabetes mellitus (T2DM). There is little data on CKD progression in Asia. We aimed to study CKD progression in T2DM and develop a model to risk stratify patients for CKD progression.

**METHODS** This was a prospective study on 1,582 patients with T2DM attending the Diabetes Centre of Khoo Teck Puat Hospital in 2002–2014. CKD progression was defined as deterioration across estimated glomerular filtration rate (eGFR) categories with  $\geq 25\%$  drop from baseline. Transitional probability matrix was constructed to examine the movement across albuminuria and eGFR categories. The dataset was randomly split for development (70%) and validation (30%). Stepwise multivariable logistic regression was used to identify baseline predictors for model development.

**RESULTS** During the median follow-up of 5.5 years, 679 (42.9%) patients had CKD progression. Progression occurred in 467 (42.2%) and 212 (44.6%) patients in development and validation datasets, respectively. The majority of patients remained in the same

albuminuria and eGFR categories, although transition probabilities decreased across more than one state. Patients with microalbuminuria were more likely to transit to normoalbuminuria than to macroalbuminuria (18.8% vs. 14.3%;  $p = 0.008$ ). Systolic blood pressure, haemoglobin A1c, eGFR and albuminuria, low-density lipoprotein-cholesterol and age were identified as predictors of CKD progression. Areas under the receiver operating characteristics curve for development and validation datasets were 0.80 and 0.83, respectively. Observed and predicted probabilities by quintiles were not statistically different from Hosmer-Lemeshow test results ( $\chi^2$ : 0.65 [ $p = 0.986$ ] and  $\chi^2$ : 1.36 [ $p = 0.928$ ], respectively) in the datasets. Sensitivity and specificity were 71.4% and 72.2%, respectively, in the development dataset, and 75.6% and 72.3%, respectively, in the validation dataset.

**CONCLUSION** There is potential for an individualised approach in preventing CKD progression. A model using routinely available clinical measurements can accurately predict CKD progression in T2DM.

## CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA001

## Impact of transdisciplinary pharmacist-physician collaboration on cardiovascular disease outcomes in the Cardiology Pharmacist Clinic of Khoo Teck Puat Hospital

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**INTRODUCTION** Cardiologists often refer poorly compliant patients with polypharmacy to the Cardiology Pharmacist Clinic (CPC) of Khoo Teck Puat Hospital to optimise outcomes. As there is a lack of local studies assessing the efficacy of the CPC, this study aimed to characterise the clinic's effectiveness.

**METHODS** CPC patients and cardiologist-only patients (i.e. patients who visited only a cardiologist without CPC referral) with first visits from January 1, 2014 to March 31, 2015 were followed up for at least six months. Haemoglobin A1c (HbA1c), low-density lipoprotein (LDL) and systolic blood pressure (SBP) levels, and readmission rates were compared within and between the groups. A CPC patient satisfaction survey was also conducted.

**RESULTS** There were 75 CPC and 108 cardiologist-only patients. The CPC group had more non-Chinese patients (60.0% vs. 44.4%;  $p = 0.038$ ) and more comorbidities (2.42 vs. 1.93;  $p = 0.001$ ) compared to the cardiologist-only group. Both groups achieved significant reductions in HbA1c ( $-0.81$  vs.  $-0.58$ ;  $p = 0.462$ ) and LDL ( $-0.97$

vs.  $-0.90$ ;  $p = 0.729$ ) levels after six months. Among patients with elevated LDL and SBP levels, those in the CPC group achieved their LDL targets significantly earlier (2.31 vs. 3.40 months;  $p = 0.002$ ) and had greater SBP reduction ( $-15.7$  vs.  $-8.35$  mmHg;  $p = 0.235$ ) compared to cardiologist-only patients. The 30-day readmission rate among CPC patients was 5% lower than the prevailing readmission rate of 13%, potentially translating to a saving of SGD 16,686. Non-Chinese patients had higher six-month readmission rates (29.0% vs. 10.0%;  $p = 0.001$ ). 96.2% of CPC patients found the CPC follow-ups beneficial because pharmacists explained conditions (90.8%) and medication instructions (91.3%), adjusted doses (84.2%), monitored side-effects (79.9%), and collaborated with doctors (81.7%).

**CONCLUSION** The CPC group achieved an impressive patient satisfaction level. Outcomes were comparable to cardiologist-only patients, but target goals may be attained faster in CPC patients, with potential cost savings.

## CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA002

## Reducing fentanyl errors

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**INTRODUCTION** Fentanyl ranked second among drugs involved in medication errors in Khoo Teck Puat Hospital, based on a review of the electronic hospital occurrence reports (EHORs) from January 2014 to June 2015. It is a high alert medication with the potential to cause grievous harm if used erroneously. This warrants action to prevent similar errors from reoccurring. This study aimed to devise interventions to mitigate gaps in the process chain of fentanyl, which had contributed to errors. The goal was to achieve a reduction in fentanyl administration errors.

**METHODS** Efforts were focused on the administration stage, at which all fentanyl errors had occurred, and root cause analysis was done to identify gaps in the current processes. A fentanyl administration chart was conceived to reduce administration errors. The modes of evaluating our intervention included an EHOR surveillance, an

'Ask-5-Take-5' survey, a post-intervention quiz and an administration chart survey.

**RESULTS** Since implementation of the administration chart in October 2015, no fentanyl administration errors have occurred as of March 2016. Comparatively, the preceding 18 months had a total of 15 fentanyl errors. All 'Ask-5-Take-5' patients were administered fentanyl correctly, and 20% more nurses were able to arrive at the correct administration rate of fentanyl with the use of the chart. Finally, a nursing survey revealed positive reception toward our intervention and the majority (95.7%) agreed that the use of the chart has the potential to reduce fentanyl medication errors.

**CONCLUSION** This intervention was largely successful in reducing fentanyl medication errors. However, more can be done to prevent prescription and pharmacy supply-related errors, as well as other medication errors.

## CATEGORY: QUALITY IMPROVEMENT (NURSING)

AHF16QN001

## Eye clinic nurse-led preoperative assessment improves cataract surgery lead time and patient satisfaction and reduces anaesthesia clinic workload

Abdul Karim R<sup>1</sup>, Yip CC<sup>1</sup>, Tan K<sup>2</sup>, Seet E<sup>3</sup>, Kumar CM<sup>3</sup>, Hoe S<sup>1</sup>, Lee SC<sup>1</sup>, Lai FW<sup>4</sup>, Chia KL<sup>5</sup><sup>1</sup>Department of Ophthalmology and Visual Sciences, <sup>2</sup>Operations Department, <sup>3</sup>Department of Anaesthesia, <sup>4</sup>Day Surgery Centre, <sup>5</sup>Nursing Administration, Khoo Teck Puat Hospital, Singapore

**INTRODUCTION** Cataract surgery (CS) is the most frequent procedure performed at the Khoo Teck Puat Hospital eye clinic. Traditionally, the patient receives an anaesthesia clinic (AC) appointment for preoperative assessment (POA) by the doctor and diagnostic testing on a separate day from the CS and often with a long lead time. This study aimed to introduce a care model that allows selected patients to undergo CS under topical anaesthesia (CSUTA).

**METHODS** The care model involves having a trained nurse conduct a same-day POA for the patient at the eye clinic upon listing and negating all diagnostic tests. All three departments (Ophthalmology and Visual Sciences, Anaesthesia and Day Surgery Centre/Nursing Departments) brainstormed to derive the workflow, and inclusion and exclusion criteria for suitable CSUTA cases. The lead time for POA and CS, patients cost savings and patient satisfaction score

(measured on a 5-point Likert score) for five domains (care model, clinic service, nurse service, waiting time and POA bill size) were measured.

**RESULTS** The study was completed in January 2016. Over a period of three years, a total of 804 CSUTA cases were seen at the Day Surgery Centre. The lead time for POA was shortened from 1–14 days to a same-day appointment, and that for CS was reduced from four weeks to two weeks. The total patients cost savings (over three years) was SGD 61,908. Among all CS patients, 11.1% saved on an additional AC visit for POA. The mean patient satisfaction score was  $3.83 \pm 0.18$  (range 3.5–4.0).

**CONCLUSION** Eye clinic nurse-led POA shortens CS lead time, lowers POA cost, negates additional AC visit and improves satisfaction in CSUTA patients.

## CATEGORY: QUALITY IMPROVEMENT (NURSING)

AHF16QN002

## Fast track protocols-driven service

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**INTRODUCTION** The fast track protocols-driven service (FTPDS) in the Accident and Emergency Department, Kwong Wah Hospital, Hong Kong, was established in mid-2013 due to an increased service demand from patients with minor conditions. The objective was to reduce waiting time, which would effectively reduce total length of stay and increase patient satisfaction. The service is also a platform for developing advanced nursing skills.

**METHODS** Trained nurses assessed the conditions of patients with lower priority based on the criteria of the respective working protocol. They then performed history taking and physical examination, and provide the appropriate treatment. Emergency physicians supported in areas such as further medical investigation where required, drug

prescription and provision of medical certificate.

**RESULTS** In 2015, the average waiting time for fast-tracked patients (n=2,343) was shortened by 3 hours 41 minutes, when compared to subsequent non-fast-tracked patients in the same triage category. The conditions treated within the scope of service were as follows: minor wounds (n = 1,012, 43.2%); fish bone in throat (n = 391, 16.7%); minor scalding (n = 215, 9.1%); animal bites and insect stings (n = 170, 7.3%); ankle sprain (n = 165, 7.0%); acute urinary retention (n = 159, 6.8%); limbs abscess incision and drainage (n = 87, 3.7%); needle stick injury/mucosal contact with others' body fluid (n = 42, 1.8%); minor head injury (n = 40, 1.7%); nasogastric tube insertion (n = 36, 1.5%); and back sprain (n = 26, 1.1%).

**CONCLUSION** FTPDS can reduce waiting time for selected patient groups of lower triage categories.

## CATEGORY: QUALITY IMPROVEMENT (PHYSICIAN)

AHF16QP001

## Reducing inpatient hypoglycaemia among inpatients with diabetes mellitus in two pilot wards

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**INTRODUCTION** Hypoglycaemia, a common complication in hospitalised patients with diabetes mellitus (DM), leads to adverse clinical outcomes. A team comprising doctors, pharmacists, nurses and health professionals from the Clinical and Food Services was formed with the objective of achieving a 30% reduction in hypoglycaemia among DM inpatients in two pilot ward areas.

**METHODS** Capillary blood glucose (CBG) readings were retrospectively analysed from point-of-care data management systems before (March to April 2015) and after (May 2015 to April 2016) the implementation of several initiatives aimed at reducing the occurrence of hypoglycaemia. These initiatives included improving clarity and accessibility of DM protocols with additional emphasis on renal impairment, inpatient DM management e-learning module for dissemination of knowledge and information to clinical staff, insulin 'traffic light system' and labelling of food trays for patients on insulin treatment to reduce the mismatch of timing between food and insulin intake, and a hypoglycaemia patient

education pamphlet. The outcome measure is the percentage of hypoglycaemia in DM patients receiving insulin/oral hypoglycaemic agents.

**RESULTS** Compared with the baseline, there was a 23.1% reduction in hypoglycaemic (CBG < 4 mmol/L) events (from 22.5% [43/191] to 17.3% [241/1,392]; p = 0.150), and a significant 57.3% reduction in severe hypoglycaemic (CBG < 3 mmol/L) events (from 4.7% [9/191] to 2.0% [28/1,392]; p = 0.025). However, there was no significant difference in the rate of recurrent hypoglycaemic events before and after the implementation of the initiatives (from 4.7% [9/191] to 4.3% [60/1,392]; p = 0.807).

**CONCLUSION** Improved delivery of services to DM inpatients through multidisciplinary collaboration and implementation of new initiatives enabled reductions in inpatient hypoglycaemia. Similar quality improvement projects will be useful in enhancing and improving the care of DM patients, who contribute to a large proportion of inpatients.



## CATEGORY: QUALITY IMPROVEMENT (PHYSICIAN)

AHF16QP002

## Mobile Ophthalmic Slit-lamp Examination System (MOSES)

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**INTRODUCTION** A hand-held Portable Slit-lamp Bio-microscope (PSB) to examine a wheelchair or bed-bound patient's eye is limited by image instability and defocus. We designed and developed a Mobile Ophthalmic Slit-lamp Examination System (MOSES) to overcome these technical limitations.

**METHODS** The technical innovations involved:

1. Wheeled unit with telescopic stand: to mount the PSB for image stability and height adjustability.
2. Three base spokes: slotted under the wheelchair/bed for close-up PSB examination.
3. Sliding examination platform: for the PSB movement to focus and target image.
4. Head-chin rest platform (adjustable height): for image stability.
5. PSB eyepiece adaptor: to fit an iPhone to capture optical images.
6. Eye Gallery Apps software: to manage the patient's bio-data and eye images for tele-consultation.

MOSES was used by clinicians and optometrists to examine patients. Questionnaire surveys on both users' satisfaction (Likert scale, 1–5) with MOSES and PSB for five domains (portability, image clarity, image stability and convenience of examination) were compared.

**RESULTS** The users (n = 21) rated higher mean satisfaction score of  $3.80 \pm 0.53$  for MOSES compared to  $3.25 \pm 0.56$  for PSB ( $p = 0.0026$ ,  $t$ -test). Except for portability, the satisfaction scores for the other four domains were also higher for MOSES (all  $p < 0.05$ ,  $t$ -test). Compared to a conventional PSB, MOSES resulted in equipment cost saving of \$20,000 and manpower saving of \$43,029 per year.

**CONCLUSION** MOSES is a lower-cost, portable and feasible system that is better received by clinicians and optometrists than PSB for use in mobility-challenged eye patients.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS003

## Combination of molecular genetic testing and clinical diagnosis for familial hypercholesterolaemia

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**INTRODUCTION** Familial hypercholesterolaemia (FH) is an autosomal dominant genetic disease characterised by high plasma low-density lipoprotein cholesterol (LDL-C) level, which increases the risk for premature cardiovascular disease. The prevalence of heterozygous FH is reported to be 1 in 200. Mutations in low-density lipoprotein receptor (LDLR), apolipoprotein B-100 (apoB) and proprotein convertase subtilin/kexin type 9 (PCSK9) genes have been reported to account for 80% of FH cases. The prevalence in Singapore is unknown. We hypothesised that patients clinically diagnosed with FH will harbour mutations in a panel of 26 genes, with the majority having LDLR, apoB or PCSK9 gene mutations.

**METHODS** Patients (proband) clinically diagnosed with definite or probable FH using the Simon Broome criteria at the Lipid Clinic, Diabetes Centre from June 2015 to March 2016 were recruited for the study. Anthropometric, biochemistry, blood and family histories were collected. DNA was extracted and 26 genes, including LDLR, apoB and

PCSK9, were sequenced by Next Generation Sequencer and validated by Sanger Sequencing.

**RESULTS** A total of 42 participants, comprising 35 male and 7 female patients, were recruited. The mean age was  $31.3 \pm 12.9$  years, mean body mass index was  $26.3 \pm 5.3$  kg/m<sup>2</sup> and mean LDL-C level was  $5.70 \pm 1.57$  mmol/L. At recruitment, 35.7% of patients were not under lipid medications. We found that 52.3% had LDLR mutations, 4.8% had apoB mutations, 14.3% had apolipoprotein E mutations, 2.4% had ATP-binding cassette transporters G5 mutation and the rest had variants of uncertain significance.

**CONCLUSION** Most patients harbour LDLR mutations. Some patients have novel mutations or differed from those in other countries, which suggests that Singaporean patients are unique in this regard. Early detection is crucial in FH patients due to their long lifetime exposure to LDL-C. Our centre offers genetic cascade screening, which is the most cost-effective strategy, to family members of probands for identification, early treatment and risk prevention.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS004

## Enhanced expression of serum osteopontin and its association with diabetic retinopathy

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**INTRODUCTION** Osteopontin (OPN) is a multifunctional pro-inflammatory cytokine, which has a suggested role in accelerated vascular remodelling, particularly in high-glucose environments as seen in patients with type 2 diabetes mellitus (T2DM). Modern immunoassay techniques have enabled the demonstration of elevated OPN concentrations in the vitreous fluid of patients with proliferative diabetic retinopathy (DR). However, the clinical association of serum OPN levels and their role as a potential biomarker for DR remains unclear. This study aimed to evaluate the correlation between serum OPN levels and the presence of DR.

**METHODS** Immunoassay techniques were used to determine serum levels of OPN in patients with T2DM. Digital colour fundus photographs from each patient were assessed for the presence of DR in a masked fashion by two independent observers.

Logistic regression was used to evaluate the association of OPN with DR.

**RESULTS** A total of 480 patients with T2DM, of whom 187 were diagnosed with DR, were included in the study. The median (IQR) serum OPN levels were significantly higher in patients with DR than in those without DR ( $64.6$  [ $49.5$ – $89.5$ ] ng/mL vs.  $51.7$  [ $38.9$ – $66.9$ ] ng/mL;  $p < 0.001$ ). After adjusting for potential confounders, multiple linear regression analysis demonstrated that higher serum OPN levels conferred an almost twofold greater risk of DR in patients with T2DM (OR 1.83, 95% CI 1.10–3.04;  $p = 0.020$ ).

**CONCLUSION** Higher serum levels of OPN were associated with the presence of DR, suggesting that serum OPN may play a role in the pathogenesis of DR and may be a potential diagnostic biomarker for diabetic eye disease.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS005

## The experience of fine needle aspiration in lymph nodes performed at Khoo Teck Puat Hospital

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**INTRODUCTION** The outpatient clinic frequently sees patients presenting with enlarging lymph nodes. Fine needle aspiration (FNA) is commonly used to triage lymph nodes because it is a cost-effective first-line approach. FNA is effective in diagnosing abscess, granuloma and metastatic carcinoma. However, it is less reliable in differentiating reactive lymphadenopathy and lymphoma because of the absence of nodal architectural assessment, risk of under-sampling and the lack of cellular materials for immune-phenotypic studies. In this retrospective review, we studied the correlation rate of FNA in lymph nodes performed at Khoo Teck Puat hospital.

**METHODS** Between January 2013 and December 2014, 203 FNAs were performed to assess lymphadenopathy in the neck (n = 176), axilla (n = 20), groin (n = 2), parotid (n = 2), breast (n = 1), mediastinum (n = 1) and femoral (n = 1). 48 lymph nodes were subsequently resected for histological analysis. Of these, 47 cases were available for cytol-

ogy-histology correlation. One case was excluded due to non-represented tissue.

**RESULTS** The sensitivity, specificity, positive predictive value and negative predictive value were 71%, 63%, 74% and 60%, respectively. For cytology-histology correlation, the concordant rate was 68% (32/47) and the discordant rate was 32% (15/47). The accuracy rates of diagnosing reactive lymphadenopathy, granulomatous lymphadenitis, inflammation/abscess, lymphoma and metastatic carcinoma were 42% (5/12), 100% (5/5), 100% (1/1), 59% (10/17) and 92% (11/12), respectively.

**CONCLUSION** FNA is highly accurate in diagnosing inflammatory processes and metastatic carcinoma. However, it is less reliable in distinguishing reactive lymphadenopathy from malignant lymphoma. Excision of lymph node should be considered in patients presenting with unexplained lymphadenopathy.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS006

## Novel association of NPAT variant and gastrointestinal side effects of metformin in patients with type 2 diabetes mellitus

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**INTRODUCTION** Approximately 20%–30% of patients with type 2 diabetes mellitus (T2DM) on metformin (the first-line pharmacotherapeutic drug) experience varying degrees of gastrointestinal (GI) intolerance. Several studies have shown that this inter-individual phenotype is partially heritable. Genetic variants identified are mostly in Europeans and conspicuously absent in Asians. As metformin GI intolerance is also commonly encountered in Asians, this study aimed to identify Asian-specific novel variants in patients with GI intolerance.

**METHODS** In this retrospective study, we used our SMART2D cohorts to select and assign 134 patients of various ethnicities to 'metformin intolerant' and 'metformin tolerant' groups based on GI symptoms upon metformin intake. Deep resequencing of exons of 21 pre-selected genes relevant to pharmacogenetics of metformin was performed using Ion Torrent. Functional annotation of identified variants was

performed with *in silico* bioinformatics algorithm. Logistic regression was performed to test the association of identified variants with GI side effects.

**RESULTS** The female gender showed a trend of association with GI intolerance (OR 1.93, 95% CI 0.95–3.92; p = 0.07). More importantly, there was a strong association between nuclear protein, ataxia-telangiectasia locus (NPAT) variant rs4144901 (Leu→Phe) and GI intolerance (OR 3.12, 95% CI 1.42–6.87; p = 0.005) after adjusting for age, gender and ethnicity.

**CONCLUSION** We showed, for the first time, the novel association between NPAT variant rs4144901 and metformin-induced GI intolerance in a T2DM Asian population. Future studies in patients with rs4144901 variants are warranted to test whether personalised dosing will allow patients to remain on treatment and enjoy multiple benefits of metformin.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS007

## Validation of reference intervals for common biochemistry analytes in a multiethnic population

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**INTRODUCTION** Reference intervals (RIs) are essential for interpretation of clinical laboratory test results in patient care. We conducted a study to validate in-use RIs for common clinical biochemistry tests.

**METHODS** Serum samples (n = 540) were obtained over a three-year period from healthy volunteers aged 21–70 years during the annual hospital staff health screening. Samples were analysed on the Roche Cobas c501 chemistry analyser (Roche Diagnostics, Switzerland) for 24 commonly requested chemistry tests. RIs were derived using parametric analysis for analytes that followed Gaussian probability distribution and non-parametric analysis for analytes that demonstrated non-Gaussian distributions. The derived RIs were compared with existing RIs in the laboratory.

**RESULTS** Our results showed that the RIs of 18 analytes in the study were generally similar to the in-use RIs. However, the RIs of

six analytes in the study differed from the in-use RIs as follows: (a) the 97.5th percentile cut-off of C-reactive protein was 9.0 mg/L vs. the recommended cut-off of 5 mg/L; (b) the 97.5th percentile value of amylase was 138 U/L vs. the current cut-off of 100 U/L; (c) the study-derived range of serum creatine kinase was 51–371 U/L vs. the recommended range of 24–200 U/L; and (d) the current upper limits of RIs for intracellular enzymes (e.g. alanine transferase, aspartate transferase and gamma-glutamyl transferase) were notably lower than the study-derived RIs even after correcting for suspected transient illness.

**CONCLUSION** Validation of manufacturer-provided RIs and previously validated data is important to ensure that RIs remain relevant to the population served by the laboratory and that appropriate care has been prescribed based on the laboratory results.

## CATEGORY: CLINICAL RESEARCH (ALLIED HEALTH)

AHF16CA002

## Efficacy and safety of antithrombotics in newly diagnosed non-valvular atrial fibrillation: a multicentred retrospective study

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**INTRODUCTION** The efficacy and safety of various antithrombotics in Singaporean patients with non-valvular atrial fibrillation (NVAf) is unclear. We sought to determine the incidence of thromboembolism and major bleeds in newly diagnosed NVAf patients and to identify the risk factors of thromboembolism and major bleeds in Asian patients.

**METHODS** In this retrospective cohort study, we followed up with patients aged  $\geq 21$  years with newly diagnosed NVAf for one year. The incidences of thromboembolism and major bleeds associated with no therapy, single antiplatelet (SAPT), dual antiplatelet (DAPT), dabigatran and rivaroxaban were compared against that of warfarin, using a generalised linear model. We also identified the risk factors for these events using logistic regression via a stepwise selection process.

**RESULTS** Among 511 patients, warfarin was more efficacious than having no therapy (RR 7.63, 95% CI 2.10–27.71), SAPT (RR 5.10, 95% CI

1.79–14.52), rivaroxaban (RR 1.72, 95% CI 0.32–9.18) and DAPT (RR 2.23, 95% CI 0.28–17.68). Warfarin was not associated with a significant increased risk of major bleeds (no therapy: RR 0.58, 95% CI 0.008–4.31; SAPT: RR 0.36, 95% CI 0.094–1.40; and rivaroxaban: RR 0.10, 95% CI 0.28–3.55). Logistic regression analysis showed that prior stroke/transient ischaemic attack and hepatic disease were risk factors for thromboembolism, while alcohol use and serum creatinine were risk factors for major bleeds.

**CONCLUSION** Warfarin had superior efficacy compared to no therapy and SAPT, and non-significant superior efficacy compared to DAPT and rivaroxaban. It is not associated with an increased major bleeding risk. We identified hepatic disease as a risk factor for thromboembolism; this was not previously described in the CHA2DS2-VASc score.

## CATEGORY: CLINICAL RESEARCH (ALLIED HEALTH)

AHF16CA003

## Incidence of venous thromboembolism in hip fracture unit patients

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**INTRODUCTION** It is known that there is a high risk of venous thromboembolism (VTE) in hip fracture patients and this risk can be reduced with appropriate prophylaxis. Our study aimed to investigate the incidence of VTE in hip fracture patients admitted to Khoo Teck Puat Hospital.

**METHODS** A retrospective review of patients admitted to our hip fracture unit (HFU) from November 2014 to April 2016 were included in the study. Data was collected using our in-house electronic medical records.

**RESULTS** A total of 390 patients were admitted to the HFU. There were 11 (2.8%) patients who developed VTE. Of these, 1 (9.1%) had both deep vein thrombosis (DVT) and pulmonary embolism, while the

remaining 10 (90.9%) had DVT. Female patients made up 81.8% of the sample, and the mean age of all patients was  $80 \pm 8.0$  years. The range of days from admission to VTE diagnosis was 4–90 (mode = 13). Out of the 11 patients, 2 (18.2%) did not receive chemoprophylaxis. There was a delay in starting chemoprophylaxis in 8 (72.7%) patients and only 1 (9.1%) received early prophylaxis upon admission. The average number of days for patients to ambulate post surgery is 4.7 (mode = 3.0).

**CONCLUSION** Our findings showed that VTE risks continued for up to three months in hip fracture patients and will not be fully eliminated, despite appropriate measures being taken. Future progression includes improving measures taken to prevent VTE while monitoring for complications and ensuring safety.

## CATEGORY: CLINICAL RESEARCH (ALLIED HEALTH)

AHF16CA004

## The safety and efficacy of venous thromboembolism prophylaxis in Khoo Teck Puat Hospital

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**INTRODUCTION** Guidelines recommend venous thromboembolism prophylaxis (VTEP) for orthopaedic patients. Locally, VTEP is not routinely adopted due to the perceptions that Asians have lower VTE but higher bleeding risks. We aimed to investigate the safety and efficacy of VTEP in Khoo Teck Puat Hospital.

**METHODS** In this prospective cohort study, patients in hip fracture or total knee replacement pathways (from August to November 2015) who were not on anticoagulants were included in the study. Information such as demographics, VTEP choice, contraindications to VTEP, initiation time and disruptions were collected from electronic databases and case notes. We also investigated deep vein thrombosis and pulmonary embolism events occurring within 90 days from admission, and bleeds classified using international guidelines.

**RESULTS** A total of 390 patients were admitted to the HFU. There were 11 (2.8%) patients who developed VTE. Of these, 1 (9.1%) had

both deep vein thrombosis (DVT) and pulmonary embolism, while the remaining 10 (90.9%) had DVT. Female patients made up 81.8% of the sample, and the mean age of all patients was  $80 \pm 8.0$  years. The range of days from admission to VTE diagnosis was 4–90 (mode = 13). Out of the 11 patients, 2 (18.2%) did not receive chemoprophylaxis. There was a delay in starting chemoprophylaxis in 8 (72.7%) patients and only 1 (9.1%) received early prophylaxis upon admission. The average number of days for patients to ambulate post surgery is 4.7 (mode = 3.0).

**CONCLUSION** VTE rates were higher in our study than in Western studies, possibly due to heightened institutional awareness. Our bleeding rates were also higher than in Western studies, which excluded renal-impaired patients. Our findings support the provision of VTEP for orthopaedic patients, but with caution for those with renal impairment.

## CATEGORY: CLINICAL RESEARCH (ALLIED HEALTH)

AHF16CA005

## Evaluation of the Padua and Caprini risk assessment models in the prediction of venous thromboembolism events: a retrospective review

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**INTRODUCTION** This study aimed to evaluate the effectiveness of the Padua and Caprini risk assessment models (RAMs) in predicting venous thromboembolism (VTE) events and to identify the most common risk factors of VTE.

**METHODS** This was a single-centre case-control study. Patients at risk of VTE who underwent radiological imaging from January to December 2014 were included in the study. Patients' VTE risk scores were assigned and their demographics were collected. Stepwise selection model and



multivariate analysis were performed to identify the most common risk factors of VTE.

**RESULTS** A total of 100 patients with VTE and 50 patients without VTE were identified. Areas under the receiver operating characteristic curve (AUROCs) of the Padua and Caprini RAMs were 0.603 and 0.619, respectively. Stepwise selection model (AUROC 0.909) and multivariate analysis (AUROC 0.870) were performed. The risk factors identified by these analyses were previous VTE, age  $\geq 70$  years, major open surgery  $> 45$  minutes in duration, bed confinement  $> 72$  hours and acute myocardial infarction (MI)/stroke. A subgroup analysis of patients

who had undergone surgery and/or were immobilised identified age  $\geq 70$  years and acute MI/stroke as risk factors. These results suggested that age  $\geq 70$  years and acute MI/stroke may be more compelling than other factors in predicting VTE events.

**CONCLUSION** Our findings suggest that the Padua and Caprini RAMs may not be good predictors of VTE. However, these RAMs, which are recommended by CHEST guidelines, remain the best available models and are useful for identifying patients at risk of VTE. The identification of pertinent risk factors provides insight into Asian patients who may be predisposed to VTE.

#### CATEGORY: CLINICAL RESEARCH (NURSING)

AHF16CN002

## A pilot study on oral health and quality of life in terminally ill cancer patients in Singapore

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**INTRODUCTION** Oral problems have been reported as an issue with terminally ill cancer patients for more than two decades. However, little is known about oral health and terminal patients' quality of life. The aim of this pilot study was to review the feasibility of the current study procedures and to determine the timeline for the second assessment of the main study variables.

**METHODS** This study employed a descriptive exploratory design, with 15 patients diagnosed with advanced cancer (mean age 70.13 years) recruited from an inpatient hospice, a daycare hospice and a palliative outpatient clinic. Patients were assessed three times in the study duration: upon recruitment and once every seven days over a two-week period. Four self-report questionnaires were used: oral health impact profile-14, the European Organization for Research and Treatment of Cancer QLQ-C15, xerostomia questionnaire and scored patient-generated subjective global assessment. Patients' oral cavity

and performance status (measured using the palliative performance scale) were clinically examined by the clinician.

**RESULTS** The results revealed that patients experienced dry/cracked lips ( $n = 13$ ), coated tongue ( $n = 11$ ), plaque ( $n = 12$ ), discomfort when eating ( $n = 6$ ), self-consciousness about mouth/dentures ( $n = 7$ ), embarrassment ( $n = 7$ ), difficulty performing social activities ( $n = 4$ ) and a general dissatisfaction with life ( $n = 6$ ). Similar findings were reported in the second and third assessments.

**CONCLUSION** The results of this pilot study confirmed its feasibility and provided some guidance on how to improve the main study processes. The findings also highlighted the high incidence of poor oral health among terminally ill cancer patients.

*Note: This abstract was presented as a poster presentation at the 19th East Asian Nursing Forum of Nursing Scholars (EAFONS) in Chiba, Japan, on March 14–15, 2016.*

#### CATEGORY: CLINICAL RESEARCH (NURSING)

AHF16CN003

## Factors affecting injury characteristics and outcomes of motorcycle collision victims in Singapore

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**INTRODUCTION** Motor vehicle collisions are the second most common cause of death in trauma. While the absolute number of deaths of motorcyclists and pillion riders in traffic collisions in Singapore decreased from 74 in 2014 to 72 in 2015, the number of injured persons in this group increased by 5.2%, resulting in an overall rise in the number of traumatic injuries from accidents.

**METHODS** This is a retrospective review of 865 motorcycle collision victims who were admitted to the Accident and Emergency Department, Khoo Teck Puat Hospital, between January 2011 and December 2015, with injury severity scores (ISS)  $\geq 9$ . Statistical

analyses included calculation of percentages and proportions, and the application of test of significance using Pearson's chi-square test. The relationship between specific sites of injuries and discharge status were examined by estimating the odds ratio of association and their 95% confidence interval. The trauma and injury severity score (TRISS) methodology was used to calculate Z scores for comparison between actual and predicted survival rates.

**RESULTS** More than half ( $n = 520$ , 60.1%) of our study population were aged  $< 40$  years, with an overall mean age of  $38.0 \pm 14.7$  years. The majority (89.7%) were male. The mean ISS and TRISS were  $18.3 \pm 12.2$

and  $90.9 \pm 22.5$ , respectively. The most commonly injured regions were the thorax (51.1%), upper limbs (48%), lower limbs (38.7%) and head (35.7%). Overall mortality rate was 8.1%; 44.3% of these patients died in the emergency room. Patients who died had multiple injuries involving two or more regions, with a preponderance of injuries to the thorax, neck, head, abdomen, pelvis and spine ( $OR \geq 3.8$ ;  $p < 0.001$ ). Within

our study population, the observed survival rate (91.9%) was similar to the TRISS predicted survival rate (94.2%).

**CONCLUSION** Road traffic collisions are a major health hazard that leads to high mortality and morbidity rates in Singapore. This study highlights the urgent need to address local road safety strategies in order to reduce injury risks.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP003

## Contrast sensitivity, and not visual acuity, is an important predictor of recurrent falls in the elderly

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**INTRODUCTION** Visual impairment is a risk factor for falls, approximately doubling the falls risk. Visual problems in more than 70% of elderly people are remediable with a simple intervention. Visual tests are done as part of a comprehensive physiologic profile approach (PPA) for falls risk assessment. This study explored how visual impairment impacted the risk of recurrent falls in a local population.

**METHODS** A total of 298 patients (mean age  $77.5 \pm 8.62$  years) visited the Falls and Balance Clinic in an acute hospital from January 2014 to December 2015. The patient's demographics, detailed fall history and resultant injuries were documented. All patients underwent PPA involving a series of vision tests, peripheral sensation, muscle force, reaction time and postural sway. Univariate and logistic regression were employed to investigate factors associated with recurrent fallers, defined as patients having  $> 2$  falls in a year.

**RESULTS** Most of the patients (57.7%) fell at home, most commonly in the toilet and bathroom (16.8%), and 177 (59.4%) sustained hip fracture. Recurrent fallers made up 31.8% of the study population. Univariate analysis revealed that low-contrast visual acuity ( $p = 0.044$ ) and edge-contrast sensitivity ( $p = 0.002$ ) were significantly associated with recurrent falls. On logistic regression, edge-contrast sensitivity ( $p = 0.027$ ) significantly predicted a higher likelihood of recurrent falls, with 2.36 times increased odds (95% CI 1.10–5.07).

**CONCLUSION** Edge-contrast sensitivity of visual function significantly predicts recurrent falls, thus making it an important potential target to be addressed in order to reduce recurrent falls. Emphasis should be given to conducting low-contrast visual tests, early referrals, low-vision rehabilitations and home modifications.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP004

## Endoscopic Pilonidal Sinus Treatment: the first report of mid- to long-term results in an Asian population cohort

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**INTRODUCTION** Endoscopic Pilonidal Sinus Treatment (EPSiT) is a new, minimally invasive procedure introduced in the West for treating Pilonidal disease (PD). To the best of our knowledge, our study is the first to evaluate the results of EPSiT in an Asian population for medium- to long-term results.

**METHODS** A total of 20 patients with PD who underwent EPSiT at a single institution were enrolled from a prospective database. Patients were reviewed in the outpatient clinic, and the surgical outcomes of pain, wound healing and discharge were recorded. Postoperative use of analgesia was also noted.

**RESULTS** 19 out of 20 (95%) patients were treated in day surgery. 2 out of 20 (10%) patients required opioids as postoperative analgesia. 17 (85%) patients who showed up during the first outpatient review within one month from the date of surgery indicated a pain score of 0–2. Of the 18 patients who returned for further reviews, 13 (65%) exhibited complete wound healing. 2 (10%) patients subsequently showed a recurrence of PD that required further intervention.

**CONCLUSION** EPSiT is a novel technique for treating PD, and thus, further studies, especially randomised trials, are required to evaluate its effectiveness in the Asian population.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP005

## Prospective observational study on the use of the King Vision® videolaryngoscope for nasotracheal intubation in patients scheduled for dental surgery under general anaesthesia

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**INTRODUCTION** The King Vision® videolaryngoscope is a newly introduced, video-assisted indirect intubation device that boasts portability, anterior blade angulation and cost-effectiveness. No study has been carried out to evaluate its outcomes for nasotracheal intubation. The aim of this study was to evaluate the suitability of the device for nasotracheal intubation in patients electively scheduled for dental surgery.

**METHODS** After obtaining ethics approval, we conducted an Alexandra Health Enabling Grant-funded prospective observational study in dental surgery from January to April 2016. Nasotracheal intubation was performed using the King Vision® videolaryngoscope in 60 patients under general anaesthesia using similar anaesthetic techniques by experienced anaesthesiologists. Time to best glottic view, time past vocal cords and time to intubation (i.e. time to first appearance of end-tidal carbon dioxide tracing) were recorded.

Demographics data, history of difficult airway, success rates and complications were also documented.

**RESULTS** The King Vision® videolaryngoscope allowed visualisation of the glottis and successful intubation in all 60 patients (mean age 27 years), including 14 patients who showed clinical features of anticipated difficult airway. The mean time to best glottic view, time to tube passing vocal cord and time to intubation were 7.1 s, 18.6 s and 38.3 s, respectively. These timings were faster than those in previously published studies using other videolaryngoscopes. A complication rate of 13.4% occurred in eight patients, mainly due to temporary malfunction of the screen.

**CONCLUSION** The King Vision® videolaryngoscope was found to be safe and easy to use in the context of elective nasotracheal intubation. Anterior blade angulation is useful for nasotracheal intubation, delivering a 100% success rate. Portability and cost are other advantages of the device.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP006

## Short-term effect of bariatric surgery on obese patients with type 2 diabetes mellitus: weight loss and haemoglobin A1c level at 6 and 12 months

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**INTRODUCTION** Evidence shows that bariatric surgery in obese patients with type 2 diabetes mellitus (T2DM) results in improved disease control. A small group of obese T2DM patients from Khoo Teck Puat Hospital who underwent bariatric surgery showed good early results in both weight and disease control. This study is a follow-up series aimed at evaluating patients' weight and haemoglobin A1c (HbA1c) level at six and 12 months after bariatric surgery.

**METHODS** A retrospective review of medical records was performed on obese T2DM patients who underwent laparoscopic sleeve gastrectomy (LSG) or Roux-en-Y gastric bypass surgery (RYGB) between 2012 and 2014. The patient's weight and HbA1c level at the time of surgery, and at six and 12 months after surgery, were recorded. The average percentage weight loss and reduction in HbA1c levels were calculated.

**RESULTS** A total of 40 patients were reviewed; 12 underwent LSG and 28 underwent RYGB. At six months after surgery, the average weight losses in the LSG and RYGB groups were 18.0% and 22.0%, respectively, and at 12 months, the corresponding mean weight losses were 20.0%, and 24.0%, respectively. Reductions in HbA1c level at six months after surgery were 2.0% and 2.3% for LSG and RYGB, respectively. Both groups had an HbA1c reduction of 2.3% at the 12-month follow-up. Only one patient had a 1.1% weight gain and increase in HbA1c of 1.4% six months after LSG.

**CONCLUSION** Our study showed that bariatric surgery leads to both weight loss and reductions in HbA1c level. The percentage weight loss in RYGB patients was higher than that in LSG patients at both the six- and 12-month follow-ups, while the reduction in HbA1c in both groups were similar at six months and plateaued at 12 months after surgery.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP007

## Epidemiological survey of the incidence of faecal incontinence in northern Singapore: interim results

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**INTRODUCTION** Faecal incontinence (FI) is an underreported disease that affects individuals physically, socially and psychologically.

**METHODS** An anonymous questionnaire was distributed to patients attending Khoo Teck Puat Hospital. The questionnaire examines patient demographics and incidence of FI. An interim analysis of data collected over one month was conducted to determine if continuous data collection was warranted.

**RESULTS** Out of the 83 participants who were surveyed, 13 (15.66%) acknowledged a history of FI. The ratio of affected men to affected

women was 7:6. Most of the affected women had undergone normal vaginal delivery (n = 4, 66.67%). The mean  $\pm$  SD (range) Wexner severity score was  $3.38 \pm 3.71$  (2–15). Out of the 13 affected patients, 5 (38.46%) stated that they sought medical advice, while 4 (30.77%) admitted to not discussing their condition with anyone. Of the 13 FI patients polled, 7 (53.85%) were interested in further information and 9 (69.23%) wanted medical treatment.

**CONCLUSION** FI is an underreported disease. Accurate reporting will benefit affected patients and aid in improving their quality of life.

## CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA003

## Application of a prognostic modelling tool for dialytic decision-making for incident end-stage kidney disease patients

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**INTRODUCTION** Although a patient-centred approach using prognostic models for dialytic decision-making is considered the standard practice, it is not widely used in Singapore. We applied one such model in a Khoo Teck Puat Hospital dialysis cohort.

**METHODS** All the incident dialysis patients from January to December 2012 were recruited. They were followed up until December 31, 2015. Baseline risk factors were scored based on the original index French Renal Epidemiology and Information Network Registry study. The point system was assigned to gender, comorbidity, body mass index and urgent need for temporary dialysis catheter insertion. Patients with more comorbidities were assigned higher scores. The summated risk scores were quintiled:  $\leq 6$  points (Q1); 7–9 points (Q2); 10–12 points (Q3); 13–17 points (Q4); and  $\geq 18$  points (Q5).

**RESULTS** A total of 77 patients started dialysis (75.3% haemodialysis); 61.5% were male and 84.6% were diabetic. Their mean age was  $59.2 \pm 11.2$  years and median dialysis duration was 40.4 (IQR 33.5, 43.5) months. The mortality rate was 5.1/1,000 patient year. The mortality rates increased from Q1 to Q5 at 15.8%, 23.1%, 37.5%, 33.3% and 75.0%, respectively, consistent with the published literature. The median survival time of Q1 to Q5 were 41.0, 42.0, 37.0, 37.0 and 14.5 months, respectively. Analysis using Cox regression model showed that the differences between quintiles were statistically significant. The mortality rate was increased by 15% with each increment in the score (CI 1.06–1.25).

**CONCLUSION** The use of a clinical scoring systems is helpful in decision-making for dialysis planning. In this study, the three-year survival rate was better in incident dialysis patients with scores  $\leq 9$ .

## CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA004

## Reducing non-formulary drug requests in the outpatient setting through formulary reformation

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**INTRODUCTION** Increased prescription and supply of non-formulary (NF) drugs through customer special orders (CSOs) causes an increase in drug costs and man-hours. In January 2015, formulary reformation led to the expansion of our hospital drug formulary and the phasing out of CSOs. NF drug orders were reviewed in a named-patient basis (NPB) to ensure the validity of indications prior to supply from the pharmacy. This study investigated the time taken to process non-urgent,

non-exemption NF drug orders before and after formulary reformation at the Khoo Teck Puat Hospital (KTPH) outpatient pharmacy. We also observed the utilisation rate of formulary drugs for patients previously on CSOs.

**METHODS** CSOs between January and June 2014 were retrospectively reviewed and cross-matched to their therapeutic options (formulary drug/external sales/NPB) from January to June 2015. Patients' follow-up

statuses of previous and current drugs received, and the amount of processing time spent by staff and patients were also collected. Data was retrieved from KTPH's electronic systems, databases and National Electronic Health Records.

**RESULTS** There were 438 CSOs from 271 patients involving 141 line items, of which 315, 109 and 14 CSOs were converted to formulary drugs, external sales and NPB drugs, respectively. As a result of

reduced ordering of NF through CSO or NPB, 0.49 full-time equivalents and 374.31 hours were saved for staff and patients, respectively. Additionally, 51.89% of CSOs were converted to formulary drugs.

**CONCLUSION** Formulary reformation was effective in reducing NF drug orders from prescribers and promotes better utilisation of formulary drugs. This saves time for patients and staff, which in turn, reduces healthcare costs.

#### CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA005

## Reducing patient exposure to ionising radiation from videofluoroscopic swallow study

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**INTRODUCTION** Videofluoroscopic swallow study (VFS) is a commonly performed procedure done under real-time X-ray guidance. Although it is useful for dynamic evaluation of the swallowing function and severity of dysphagia, it exposes patients and staff to ionising radiation. Preliminary review shows that the average dose-area product (DAP) of our patients is approximately 3.3 Gy·cm<sup>2</sup>, which is higher than the published benchmark of 2.4 Gy·cm<sup>2</sup>. A team was formed to evaluate the current work processes so as to reduce the amount of radiation exposure during VFS.

**METHODS** A 'cause and effect' diagram was used to evaluate the root causes leading to high radiation exposures. A Pareto chart was used to identify problems that required immediate actions. Mean monthly DAP values were tracked for 12 months. Two intervening measures were intro-

duced consecutively. Mean monthly DAP values were then compared before and after the introduction of the respective interventions.

**RESULTS** A run chart showing the mean monthly DAP values was used to demonstrate the effectiveness of change. Introduction of the first measure showed equivocal results in reducing radiation exposure, while the second measure proved to be more effective, with the mean monthly DAP being consistently below the target of 2.4 Gy·cm<sup>2</sup>. This relates to improvements in provision of patient care, as the measures were effective in reducing unnecessary radiation exposure.

**CONCLUSION** Practice of 'as low as reasonably attainable' principles among radiation workers is crucial in minimising the harmful effects of radiation. Comprehensive review of the workflow is essential to discover potential areas of improvements.

#### CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA006

## The Capsule workflow: redesigning medication processing and bill collection flow at the outpatient pharmacy in Khoo Teck Puat Hospital

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**INTRODUCTION** The Capsule workflow was designed to address the long waiting time at the Khoo Teck Puat Hospital outpatient pharmacy (OP). This involved introducing a one-stop billing service and reducing unnecessary waiting points and reworks. This study aimed to evaluate the feasibility of permanently implementing this new workflow.

**METHODS** The Capsule workflow trial was implemented from June to November 2015 in various locations, including the level 1 OP, and the levels 4 and 5 specialist outpatient clinics (SOCs). Outcome measures included waiting time, patient satisfaction and productivity. Patients' journey time is defined as the time from which patients leave the SOCs to the time they leave the OP. Satisfaction data was collected through surveys and productivity was assumed to be a measure of both manpower and load.

**RESULTS** The location near the level 5 SOC was found to be the most suitable for our trial, as it had a greater number of patients and

the best workflow. Data showed a considerable reduction in the patient's mean journey time before and after the workflow implementation (average 54.4 minutes vs. 24.9 minutes). The Capsule workflow also showed positive impact on the waiting time of all patients (including those not assigned to the new workflow); 78% of patients were served within 30 minutes as compared to 60% at baseline. 98% of the patients were satisfied with their waiting time as compared to 62% before implementation. The workflow achieved better productivity, with a calculated manpower cost-saving of approximately SGD 588,000 annually.

**CONCLUSION** Overall, the Capsule workflow was well received. Results have shown that it was effective in reducing waiting time, improving patient's satisfaction and achieving better productivity. Future optimisation of this workflow can ensure its feasibility and sustainability for permanent implementation.



## CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA007

## Perceptions and attitudes of teenagers toward seniors in Singapore

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**INTRODUCTION** Given the rapidly ageing population in Singapore, it is pertinent to understand how younger people view seniors in our society. As there has been no previous study on the issue, this study explored the attitudes and perceptions of teenagers toward seniors in Singapore.

**METHODS** A total of 1,405 secondary school students (mean age 14.9 ± 1.3 years) provided information about their relationships with their grandparents and their attitudes toward seniors via a custom-designed questionnaire. Multiple regression and mediation analyses were performed to investigate factors influencing their perceptions toward ageing.

**RESULTS** A majority (81.7%) of the interviewed teenagers considered people aged ≥ 60 years as elderly. Among the respondents, 60.9% perceived ageing to be a time of peace and contentment, 57.1% opined that seniors are wise and 55.4% believed that the elderly can still

contribute to family and society. However, 55.4% of the teenagers held negative perceptions such as seniors being burdensome to the family and society. Staying with grandparents posed challenges to most (85.8%) teenagers, as exemplified by difficulties in communication and conflicts due to differing values and beliefs (46.4% and 33.5%, respectively). Regression analysis revealed that while teenagers' closeness to grandparents accounted for a significant 1.70% of the variance in their perception scores ( $\Delta R^2 = 0.17$ ,  $F(1, 1) = 24.3$ ;  $p < 0.01$ ), challenges explained an increase in variance to 6.6% ( $\Delta R^2 = 0.066$ ,  $F(1, 1) = 46.7$ ;  $p < 0.01$ ).

**CONCLUSION** This study showed that teenagers possess both positive and negative attitudes toward seniors. Efforts should be taken to nurture positive attitudes by addressing the challenges expressed by teenagers, via educational programmes and pastoral care.

## CATEGORY: QUALITY IMPROVEMENT (NURSING)

AHF16QN003

## Garnering staff toward a cleaner and safer environment: the National Kidney Foundation experience

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**INTRODUCTION** During haemodialysis treatment in the dialysis centre, there is a potential for cross-contamination of infectious agents through contaminated devices, hands, equipment, supplies and environmental surfaces in a dialysis centre. To reduce the risk of acquiring infections, staff routinely clean and disinfect medical equipment and high-touch areas after each patient's haemodialysis treatment at the National Kidney Foundation (NKF). The aim of this study was to assess compliance of environmental cleaning of high-touch areas and develop an intervention programme to achieve compliance ≥ 85%.

**METHODS** This is a quantitative study involving 29 Infection Control Link nurses (ICLNs) at the community-based dialysis centres (CB-DCs), NKF from October 2015 to April 2016. In November 2015, ICLNs conducted an environmental cleaning assessment of high-touch areas using a checklist and the Glo Germ™ Kit, to ascertain the efficacy of environmental cleaning at 29 CB-DCs.

Pre-study data showed an overall average of 67% compliance. Root cause analysis revealed the absence of an assessment/audit tool for high-touch areas, a lack of training leading to knowledge deficit, poor cleaning techniques and staff incompetency. Interventions included a checklist (i.e. audit tool) for environmental cleaning assessment of high-touch areas, a 'Train the Trainer' programme for the 29 ICLNs, an annual competency assessment, and video tutorials on environmental hygiene to standardise practice.

**RESULTS** Following the intervention, environmental cleaning assessment of high-touch areas showed an overall average of 86% compliance, with 17 CB-DCs achieving ≥ 85% compliance in environmental cleaning of high-touch areas.

**CONCLUSION** This study illustrates that the intervention programme increases staff awareness, thereby improving compliance. Besides promoting positive outcomes, it enhances the internal monitoring system at the NKF.

## CATEGORY: QUALITY IMPROVEMENT (NURSING)

AHF16QN004

## Microbiological surveillance of reprocessed endoscopes

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**INTRODUCTION** Quality control checks have been greatly regulated and reformed preceding the worldwide gastrointestinal endoscopy reports of endoscope pathogen transmission with antibiotic-resistant microorganisms, specifically *Carbapenem-resistant Enterobacteriaceae*. This study aimed to establish a pertinent endoscope microbiology test guideline for monitoring the effectiveness of reprocessing endoscopes and appropriate endoscope storage.

**METHODS** A microbiology test was performed on reprocessed endoscopes. At our centre, gastroscopes (n = 16) and colonoscopes (n = 15) are cultured twice a year, while duodenoscopes (n = 3) and bronchoscopes (n = 6) are tested every month. Microbiology testing was conducted in two phases: within seven days of storage in an endoscope-drying cabinet; and immediately after reprocessing. The endoscope suction, biopsy and auxiliary channels were flushed with an aliquot part of 50 mL normal saline solution. Taking into account the complexity of the duodenoscope structure, the flush-elevator

brush-flush technique was applied in the sample collection. The culture method was used mainly to detect the presence or absence of microorganisms.

**RESULTS** All endoscopes that were sampled within seven days of storage were free of microbial growth. Among the 38 endoscopes tested shortly after reprocessing, duodenoscope fluid samples were found to have Gram-negative bacterial contamination. Endoscope bacterial contamination and false-positive results were found to be caused by an issue with the washer-disinfector tubing hookup, which was left wet overnight.

**CONCLUSION** Based on our findings, routine endoscope microbiological surveillance has proven to be a relevant quality assurance measure to determine whether there are breaches in the reprocessing of endoscopes and culture sampling approach. This measure can prevent patients from being exposed to the risk of possible infection.

## CATEGORY: QUALITY IMPROVEMENT (NURSING)

AHF16QN005

## Disinfection of sink surfaces after an infectious case

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**INTRODUCTION** Sink surfaces can harbour microorganisms. Endoscopes or accessories that come in contact with contaminated sinks can contribute to cross-transmission of infection. This study aimed to determine whether wiping down of infected sink areas with a recommended disinfectant rendered the same result as soaking the sink with the disinfectant.

**METHODS** The three most common infectious diseases encountered in our endoscopy centre for the past 16 months were hepatitis B, methicillin-resistant *Staphylococcus aureus* and extended-spectrum beta-lactamases. The decontamination room sinks that were exposed to the three bacterial groups were sampled for microbiological testing after two disinfection paths, i.e. sink-soaking with approved water and disinfectant dilution, and wiping down the sink with the recommended

disinfectant. Both processes have an optimum disinfectant contact time of 15 minutes.

**RESULTS** Microbiology test samples between soaking and wiping of contaminated sinks using the appropriate disinfectants (sodium dichloroisocyanurate and phenolic disinfectants) yielded the same negative results of bacterial growth. The culture test results also verified the efficacy of the disinfectants in eliminating bacteria within the contact time of 15 minutes.

**CONCLUSION** The outcome of the study validated that wiping down of infected sinks with recommended disinfectants can eliminate and prevent pathogen growth. Compared to the sink-soaking disinfection process, sink surface disinfection via wipe-down can vastly reduce the usage of water and disinfectants by 80% and 75%, respectively. Furthermore, it can greatly minimise the reprocessing staff's exposure to disinfectants.

## CATEGORY: QUALITY IMPROVEMENT (NURSING)

AHF16QN007

## Safe storage time for reprocessed flexible endoscopes

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**INTRODUCTION** Flexible endoscopes have a complex internal structure that may harbour microorganisms. It is essential for endoscope disinfection and storage to be in accordance with infection control standards. This study aimed to determine the effectiveness of endoscope reprocessing and the maximum length of storage time for

reprocessed endoscopes that can be safely used without any risk of bacterial contamination.

**METHODS** A longitudinal, randomised controlled field study was conducted for 15 months. Microbiology testing was performed on gastroscopes (n = 16), colonoscopes (n = 15), duodenoscopes (n = 3), and

bronchoscopes (n = 6) at various time periods: immediately after reprocessing; after 24 hours; after three days; and after seven days of storage in a clean, well-ventilated drying cabinet. A total of 38 endoscopes were collected in both the suction channels and biopsy ports, which produced 141 fluid specimens.

**RESULTS** Out of the 38 endoscopes that were tested soon after reprocessing, 4 showed the presence of microbial growth. The possible contributing factor of endoscope bacterial contamination and false-positive result was found to be an issue with the automated

endoscope reprocessor tubing hookup, which was left wet overnight and used in reprocessing. All endoscopes that were sampled after 24 hours and up to seven days' storage in an endoscope cabinet were free of bacterial growth.

**CONCLUSION** The outcome of the study validated that reprocessed endoscopes that are properly stored in an appropriate drying cabinet within three days for a maximum of seven days can be safely used on patients. Our findings have helped to eliminate the unnecessary reprocessing of endoscopes and reduced the exposure of staff to disinfectants.

#### CATEGORY: QUALITY IMPROVEMENT (PHYSICIAN)

AHF16QP003

## The impact of the Transitional Care Service on hospital utilisation, mortality and cost

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**INTRODUCTION** Given our ageing population and increased prevalence of complex chronic diseases, hospitals in Singapore are facing a bed crunch situation. The Transitional Care (TC) Service of our hospital aims to reduce hospital utilisation, through post-discharge home visits by doctors, nurses and therapists. This study aimed to evaluate the impact of the TC Service on hospital utilisation, mortality and cost.

**METHODS** We analysed a retrospective cohort of patients eligible for the TC Service and compared patients who accepted the service (TC patients) versus those who did not (control patients) from April 1, 2012 to March 31, 2014. We employed difference-in-difference models to compare the number of hospitalisations, Department of Emergency Medicine (DEM) visits, and hospital length of stay (LOS) at 30, 90 and 180 days post-index hospitalisation discharge, between the inter-

vention and control groups. Mortality data was obtained from the death registry.

**RESULTS** TC patients had fewer 30, 90 and 180 days rehospitalisations and shorter LOS as compared to control patients. There was a total saving of 4.20 bed-days in 180 days follow-up, which was statistically significant. There was no difference between the groups in DEM 180-day use or mortality at 30, 90 or 180 days. There was an average inpatient saving of SGD 2,765/patient at the 180 days; after adjusting for TC Service and specialist outpatient clinic costs, there was a nett saving of SGD 1,406/patient. As the TC Service manages 700 patients per year, this translates to a total saving of SGD 984,000 from a societal perspective.

**CONCLUSION** The TC Service is effective in reducing hospital bed-days and enhancing cost-savings. Developing the TC Service may address the current bed crunch situation.

#### CATEGORY: QUALITY IMPROVEMENT (PHYSICIAN)

AHF16QP004

## The invisible carers of our seniors: a qualitative study of the factors influencing caregiving by foreign domestic workers in a developed country

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**INTRODUCTION** In Singapore, the number of foreign domestic workers (FDWs) has been increasing. While previous studies reported that family caregivers of the elderly face higher risks of poor health, few studies have been done on FDW caregivers, who may be doubly vulnerable due to multiple stresses of caring for a frail elderly person. This qualitative study aimed to explore the factors influencing the quality of caregiving by FDWs to seniors.

**METHODS** The qualitative component comprised semi-structured, in-depth interviews of 25 FDW caregivers and five healthcare staff from Khoo Teck Puat Hospital, selected through snowball sampling. Transcribed interviews were analysed inductively with thematic analysis.

**RESULTS** FDWs interviewed were from Indonesia, the Philippines and Myanmar, who looked after frail elderly persons in Singapore. Almost half of the interviewees cared for elderly persons with dementia, and reported common challenges such as difficulty sleeping, verbal abuse, lack of privacy and difficult behaviour. Positive factors enhancing resilience included empathetic and supportive employers, a positive relationship with the elderly person, respite such as regular off-days and an additional FDW to assist with other demands. Discouragement due to poor relationship with their employers was a strong predictor of stress, manifesting as fatigue. Most interviewees expressed the desire to learn more caregiving skills, which they perceived as a form of investment into their education.

**CONCLUSION** FDW caregivers face not only great demands while caring for elderly persons, but also barriers in accessing training and coping skills. Clinic visits and time spent in wards could be opportu-

nities to assess their mental well-being and to include them in training or support groups. Solutions must be implemented in a culturally competent manner.

**CATEGORY: QUALITY IMPROVEMENT (PHYSICIAN)**

**AHF16QP005**

## Will teenagers today live with and care for their aged parents tomorrow?

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**INTRODUCTION** Elderly Singaporeans who live alone are 1.7 times more likely to die prematurely as those living with family or friends, but there is a growing trend toward children staying apart from their parents. This study explored the willingness of teenagers to live with and care for their aged parents in the future and the reasons for their decision.

**METHODS** We employed a convenient sampling of 1,405 secondary school students (mean age  $14.9 \pm 1.30$ ) attending a dementia outreach programme. A purpose-designed questionnaire was administered to elicit the students' understanding of and attitude toward ageing. A single, open-ended question elicited their willingness to live with and care for their aged parents. Thematic analysis was employed to understand the reasons for their choice.

**RESULTS** The majority (83.3%) of teenagers chose to live with their parents and the reasons fell into four categories: (a) desire

to care; (b) expression of love; (c) sense of responsibility; and (d) prompted by moral values. Among those who opted not to live with their parents, the reasons included: (a) respect parents' preference; (b) desire for privacy; and (c) desire for independence and freedom. However, most (85.8%) teenagers acknowledged that staying with elderly parents could pose challenges. The difficulties expressed included: (a) challenges in communication (46.4%); (b) conflicts due to different values and beliefs (33.5%); (c) interference with family decision-making (26.5%); and (d) intrusion of family activities (18.8%).

**CONCLUSION** Most of the teenaged students opted to stay with their parents but also anticipated challenges. Efforts can be undertaken to address the challenges expressed, to better sustain the family as the social safety net.

**CATEGORY: QUALITY IMPROVEMENT (PHYSICIAN)**

**AHF16QP006**

## Surgical placement of peritoneal dialysis catheter by interventional nephrologist: initial experience and impact on peritoneal dialysis programme development

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**INTRODUCTION** Over the last decade, less than 20% of end-stage renal failure patients in Singapore have chosen peritoneal dialysis (PD) over haemodialysis. One of the reasons could be difficulty in accessing PD catheter insertion service. The objective of this study was to share the initial experience of surgical placement of PD catheter and analyse its potential impact on PD service development.

**METHODS** We postulated a new model of care by providing a collaborative service between nephrologists and urologists, with the built-up of a hassle-free portal for accessing PD catheter insertion, which could accentuate PD uptake. Since January 2015, nephrologists have been credentialed by urologists to independently perform the operation.

**RESULTS** A total of 118 patients had 121 PD catheter insertions done from January 2011 to April 2016. Nephrologists performed 48 new

placements of PD catheters. Baseline demographics of patients operated by urologists and nephrologists were similar, except that the latter group comprised fewer hypertensive patients (98.5% vs. 87.5%;  $p = 0.015$ ). The complication rates for both operators were comparable to international standards. The number of insertions in 2015 was significantly increased to 37 from 17, which was the annual average number of PD insertions from 2011–2014 ( $p = 0.019$ ). There was also a tendency to increase the number of incidence patients entering the PD programme in 2015 ( $n = 28$ ) as compared to 2011–2014 ( $n = 11$ –19;  $p = 0.073$ ).

**CONCLUSION** The new collaborative service model could facilitate an increase in uptake of patients to the PD programme with maintenance of current standard of care. Longer follow-up is required to demonstrate its sustainability.

## CATEGORY: QUALITY IMPROVEMENT (PHYSICIAN)

AHF16QP007

**‘Amor vincit omnia’: hospital security officers improve safety of patients during restraint***Wong PW<sup>1</sup>, Toh CO<sup>2</sup>, Bin Pagi H<sup>2</sup>, Ng Z<sup>3</sup>, John S<sup>4</sup>, Chen Z<sup>5</sup>, Velusamy P<sup>6</sup>, Ng ESP<sup>2</sup>**<sup>1</sup>Department of Anaesthesia, <sup>2</sup>Operational Support Services, Khoo Teck Puat Hospital, <sup>3</sup>U-Elite Martial Fitness, <sup>4</sup>Department of Psychiatric Medicine,**<sup>5</sup>Department of Psychological Medicine, <sup>6</sup>Nursing Directorate, Khoo Teck Puat Hospital, Singapore*

**INTRODUCTION** The increasing incidence of violence among patients with medical pathologies has become a challenge to healthcare workers, especially where physical restraint is of concern. Frailty and medical conditions render techniques taught to other industries typically inappropriate. At Khoo Teck Puat Hospital, the hospital management, clinicians, security officers and industry leaders have developed our own restraint methodology and has become the first hospital in Singapore to devise a medically verified physical restraint technique targeted at frail patients.

**METHODS** Security officers were identified as ‘conflict resolution champions’. Workshops were instituted and regular training implemented. Pre- and post-workshop survey questionnaires were completed by all 26 security officers, to quantify the level of self-assessed knowledge, confidence, preparedness, as well as individual and teamwork confidence, during medically indicated manual restraint of the frail patient.

**RESULTS** All the officers found the workshops relevant. The post-course median self-assessed knowledge rating improved to ‘excellent’ from the pre-course rating of ‘average’ (scale of poor = 0 to excellent = 5). There was perceived improvement in confidence (23%) and preparedness (20%) to manually restrain patients. 92% of participants felt the workshops dealt with their concerns regarding conflict and restraint situations. There was an improvement in confidence as an individual (12%) and team (13%) to manage conflict situations.

**CONCLUSION** Dealing with workplace violence illustrates the effectiveness of surveillance by hospital management to continually monitor the needs of ground staff and implement solutions to protect and empower them. Standardised training empowers security officers with knowledge and techniques that will protect patients, staff and themselves from injury. By working within institution standards, concerns regarding litigation and workplace injury are also addressed.



## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS008

## Molecular methodology to circumvent BSL3 requirement to process respiratory tuberculosis samples

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**INTRODUCTION** Rapid diagnosis of *Mycobacterium tuberculosis* (MTB) complex, which is the causative agent for most cases of tuberculosis (TB), is of paramount importance due to the risk of spread of disease, potential for emergence of drug-resistant strains and severity of disease in patients infected with HIV-1. However, isolation of an organism from MTB complex for definitive diagnosis of TB is time-consuming and requires biosafety level 3 (BSL3) laboratory facilities. In this study, we evaluated the Roche COBAS® TaqMan® MTB Test. This polymerase chain reaction (PCR)-based assay allows for processing and analysis of respiratory TB samples under closed settings, which is relatively safer than conventional culture, without the need for a BSL3 laboratory requirement.

**METHODS** A total of 216 respiratory samples, which have been decontaminated with N-acetyl-L-cysteine and liquefied, were first

processed using the Roche Amplicor Respiratory Specimen Preparation Kit (Roche Diagnostics, Switzerland), followed by qualitative PCR on the Roche COBAS® TaqMan® 48 Analyser. Data was analysed using binary matrix.

**RESULTS** Of the 216 samples, 17 were excluded from data analysis due to invalid PCR results (n = 9) and non-conclusive culture results due to overgrowth of non-mycobacterial organisms (n = 8). PCR assay yielded a sensitivity and specificity of 78.26% and 99.43%, respectively, when compared to TB culture alone.

**CONCLUSION** We found the detection of TB by molecular method to be of value to diagnostic laboratories. This is based on the findings of our evaluation, as well as the added advantages of ease of processing, reduced time to positivity and negligible biosafety risk.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS009

## Association of fractalkine and overt albumin excretion in type 2 diabetes mellitus

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**INTRODUCTION** Diabetic nephropathy (DN) is the leading cause of end-stage renal disease (ESRD) worldwide. Clinical features of DN include persistent albuminuria and progressive decline in the glomerular filtration rate (GFR). Inflammation plays a central role in the pathogenesis of DN. Therefore, identification of inflammatory mediators may potentially contribute to the development of new therapeutic strategies. Fractalkine (FKN) is a pro-inflammatory chemokine that has been linked to obesity and type 2 diabetes mellitus (T2DM). We hypothesised an association of FKN with albuminuria and GFR in T2DM patients.

**METHODS** Plasma FKN levels were measured in 217 Chinese individuals (67.1% male; mean age 60 ± 11 years) with T2DM using immunoassay. Univariate and multivariate analyses were performed to evaluate the association of FKN with albumin:creatinine ratio (ACR) and estimated GFR (eGFR).

**RESULTS** Higher FKN levels in patients stratified by FKN tertiles displayed increased ACR and reduced eGFR (all p < 0.01). Spearman's correlation revealed significant correlation of FKN with ACR (r = 0.176; p = 0.015) and eGFR (r = -0.426; p < 0.001). Log-transformed ACR (B = 0.041; p < 0.001) and eGFR (B = -0.001; p = 0.033) remained associated with FKN after adjusting for age, gender and body mass index (BMI). Multivariate linear regression analysis with renal function as the outcome variable demonstrated that FKN was an independent determinant of ACR (B = 1,702.508; p < 0.001) and eGFR (B = -32.128; p < 0.001) after adjusting for age, gender, duration of T2DM, BMI, haemoglobin A1c, low-density lipoprotein-cholesterol and systolic blood pressure.

**CONCLUSION** Pro-inflammatory FKN is associated with albuminuria and eGFR in Chinese patients with T2DM. Whether FKN is involved in the development and progression of chronic kidney disease remains to be investigated.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS010

## A study of the association of betatrophin with obesity and diabetes mellitus

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**INTRODUCTION** The prevalence of type 2 diabetes mellitus is increasing worldwide, and identification of novel therapeutic biomarkers of β-cell function and diabetic risks is critical.

Betatrophin has drawn attention as a potential β-cell regenerative therapy in diabetes mellitus. We aimed to assess the levels of betatrophin, with the hypothesis that it will be differentially

expressed in patients with different fasting plasma glucose (FPG) levels body mass index (BMI).

**METHODS** A total of 405 patients were recruited from our hospital's Health for Life clinic and wards. Lean and obese cohorts were selected based on BMI  $\leq 23$  kg/m<sup>2</sup> and BMI  $\geq 28$  kg/m<sup>2</sup>, respectively, while non-diabetic and diabetic cohorts were chosen based on FPG  $\leq 5$  mmol/L and FPG  $\geq 7$  mmol/L, respectively. Serum betatrophin levels were measured using immunoassay in lean control (n = 28), lean diabetic (n = 22), obese non-diabetic (n = 33) and obese diabetic (n = 54) patients. Anthropometric parameters were also measured.

**RESULTS** Serum betatrophin levels differed significantly ( $p < 0.0001$ ) among the four cohorts (mean age  $44.62 \pm 12.17$  years). There was a twofold increase in serum betatrophin levels in lean and obese diabetic patients ( $1,816.09 \pm 906.23$  pg/mL and  $1,617.05 \pm 980.07$  pg/mL, respectively) as compared to lean and obese non-diabetic patients

( $866.67 \pm 450.80$  pg/mL and  $769.68 \pm 336.61$  pg/mL, respectively). Spearman correlation analysis showed that serum betatrophin was positively associated with age ( $p = 0.375$ ;  $p < 0.0001$ ), ethnicity ( $p = 0.234$ ;  $p = 0.006$ ), FPG ( $p = 0.464$ ;  $p < 0.0001$ ), insulin ( $p = 0.244$ ;  $p = 0.005$ ), homeostatic model assessment of insulin resistance (HOMA-IR) ( $p = 0.381$ ;  $p < 0.0001$ ), and negatively correlated with gender ( $p = -0.222$ ;  $p = 0.009$ ), high-density lipoprotein-cholesterol (HDL-C) ( $r = -0.382$ ;  $p < 0.0001$ ). Ethnicity and gender were referenced against Chinese ethnicity and male gender. Log-transformed betatrophin concentration remained significantly associated with gender ( $B = 0.163$ ;  $p = 0.001$ ), age ( $B = 0.008$ ;  $p < 0.0001$ ) and log HOMA-IR ( $B = 0.096$ ;  $p = 0.013$ ) after adjustment.

**CONCLUSION** Our results showed a higher circulating betatrophin in diabetic cohorts than non-diabetic cohorts. Further *in vitro* work is planned to understand the significance of these raised levels.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS011

## Evaluation of the RAPIDEC® CARBA NP test for rapid detection of carbapenemase-producing enterobacteriaceae

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**INTRODUCTION** Carbapenem-resistant *enterobacteriaceae* (CRE) are a major infectious disease and infection control threat. The most important mechanism leading to carbapenem nonsusceptibility is the production of carbapenemase enzymes such as NDM-1, KPC and OXA-48-like (e.g. OXA-181, OXA-232) enzymes, and these strains are called carbapenemase-producing CRE (CP-CRE). CRE strains are currently sent to reference labs, including the National Public Health Laboratory, to detect and characterise CP-CRE. This study was intended to evaluate a commercially available colourimetric carbapenemase production assay, the RAPIDEC® CARBA NP (bioMérieux, France), which offers rapid results of between 30 minutes and two hours.

**METHODS** A collection of 50 enterobacteriaceae clinical isolates was tested using the RAPIDEC® CARBA NP – 32 contained different

classes of carbapenemases (e.g. KPC, NDM, OXA-181, OXA-232) and 18 contained non-carbapenemase producers; all isolates were confirmed using polymerase chain reaction.

**RESULTS** The RAPIDEC® CARBA NP detected all carbapenemase producers. The specificity and positive predictive value were 88.88% (16/18) and 94.11% (32/34), respectively. The sensitivity and negative predictive value were 100% ([32/32] and [16/16], respectively) for both groups of isolates.

**CONCLUSION** The assay performed well in our laboratory. The sensitivity and negative predictive value were 100%, while the specificity and positive predictive value were acceptable. This test would have utility in the event of a future massive outbreak of CP-CRE in the hospital. We are exploring further options for in-house molecular characterisation of CP-CRE.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS012

## Central arterial stiffness is associated with the presence and severity of diabetic retinopathy among Asians with type 2 diabetes mellitus

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**INTRODUCTION** Arterial stiffness has been associated with diabetic retinopathy (DR). We aimed to examine the association of central arterial stiffness (CAS) with the presence and severity of DR in a multi-ethnic Asian cohort with type 2 diabetes mellitus (T2DM).

**METHODS** CAS was estimated by carotid-femoral pulse wave velocity (PWV) and augmentation index (AI) using the applanation tonometry

method in 470 patients with T2DM in Khoo Teck Puat Hospital from 2011 to 2014. Digital colour fundus photographs were examined for the presence of DR in a masked fashion. Retinopathy severity was categorised into non-proliferative DR (NPDR) and proliferative DR (PDR). Multivariable logistic regression was used to estimate the odds ratio (OR) for DR.

**RESULTS** DR was diagnosed in 187 (39.8%) patients, including 140 NPDR and 44 PDR patients (three were ungradable). The mean PWV and AI were significantly higher in DR than non-DR patients ( $10.9 \pm 3.3$  m/s vs.  $8.8 \pm 2.6$  m/s;  $p < 0.001$  and  $28.4 \pm 8.8\%$  vs.  $22.8 \pm 12.1\%$ ;  $p < 0.001$ , respectively). PWV (OR 1.13, 95% CI 1.03–1.23;  $p = 0.008$ ) and AI (OR 1.03, 95% CI 1.01–1.06;  $p = 0.008$ ) remained associated with the presence of DR after adjustment. In stage analyses, PWV and

AI showed significant associations with NPDR (PWV: OR 1.11, 95% CI 1.01–1.22;  $p = 0.023$ ; AI: OR 1.03, 95% CI 1.01–1.05;  $p = 0.032$ ) and PDR (PWV: OR 1.17, 95% CI 1.02–1.34;  $p = 0.026$ ,  $p$ -trend = 0.009; AI: OR 1.05, 95% CI 1.02–1.10;  $p = 0.011$ ,  $p$ -trend = 0.004).

**CONCLUSION** Higher CAS was associated with the presence and severity of DR in patients with T2DM, which suggests its aetiologic implication in DR.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS013

## An evaluation of the performance of the Roche Cobas B101 point-of-care system in the measurement of haemoglobin A1c

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**INTRODUCTION** Management of diabetic patients is dependent on the monitoring of haemoglobin A1c (HbA1c) using anticoagulated venous blood specimen in the laboratory or capillary blood sample from a finger prick at the point of care (POC). Our aim was to: (a) evaluate the performance of a POC HbA1c measurement method against the analytical method used in our laboratory; and (b) compare the difference between measurements of HbA1c in venous blood samples and capillary blood samples.

**METHODS** We performed a correlation study between the Roche Tina-quant® HbA1c Gen. 3 (A1C-3) method on the Cobas C501 system (Roche Diagnostics, Switzerland) and the Roche Cobas B101 system (Roche Diagnostics, Switzerland) by measuring HbA1c in 47 venous samples. We compared the measurement of HbA1c in venous blood using the Roche A1C-3 method against that in capillary blood using the

Cobas B101 in 39 patients presenting to the Khoo Teck Puat Hospital Diabetes Clinic.

**RESULTS** Correlation study between the two methods using venous specimens showed the following:  $y = 0.92x - 0.42$ ,  $R = 0.977$ , while correlation study between venous and capillary blood samples showed the following:  $y = 0.83x + 0.97$ ,  $R = 0.978$ . There was significant bias of  $-0.5\%$  ( $p < 0.005$ ) observed in HbA1c measurement in capillary blood samples.

**CONCLUSION** While the measurement of HbA1c showed good correlation between the two different methods studied, it should be noted that measurement of HbA1c using blood samples from different collection sites can result in significant differences between results, which could result in mismanagement of patients with diabetes mellitus. All HbA1c results reported should be accompanied by the methodologies used in order to avoid confusion to the physicians.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS014

## Evaluation of faecal qualitative immunochemical test kits

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**INTRODUCTION** The main purpose of the faecal immunochemical test (FIT) is to screen for early signs of colon cancer. The FIT does not require any dietary restriction and can detect small amounts of human haemoglobin, which is a biological indicator of gastrointestinal disease.

**METHODS** A total of 48 random stool specimens requested for occult blood testing were selected and run concurrently on the same day of receipt. The stool samples were analysed using the OC-Light® S FIT kit (Eiken Chemical Co Ltd, Japan) and the Actim Fecal Blood test kit (Medix Biochemica, Finland), concurrently with the OC-Light fecal occult blood test (FOBT) (Eiken Chemical Co Ltd, Japan).

**RESULTS** The OC-Light® S FIT kit and Actim Fecal Blood test kit were compared against a commercially available predicate device,

the OC-Light FOBT using 48 specimens. The positive and negative agreement of results between the OC-Light® S FIT kit and the OC-Light FOBT was 100%. Meanwhile, the positive and negative agreement of results between the Actim Fecal Blood test kit and the OC-Light FOBT was 88.2% (15/17) and 96.7% (30/31), respectively. The clinical histories of the three subjects with discordant results were evaluated; we concluded that the results from the OC-Light® S FIT kit could be more reliable and accurate.

**CONCLUSION** The analytical performance of the OC-Light® S FIT device is substantially equivalent to, and in fact better than, the predicate, with a more visible red/pinkish result line for OC-Light® S FIT versus a green result line for OC-Light FOBT.

## CATEGORY: BASIC SCIENCE RESEARCH

AHF16BS015

## Liquid-based cytology of thyroid fine-needle aspiration: cytotechnologists' perspective in a pilot study of 36 cases

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**INTRODUCTION** Fine-needle aspiration (FNA) is the standard procedure performed to evaluate thyroid nodule at Khoo Teck Puat Hospital. Rapid on-site evaluation (ROSE) is routinely performed with conventional smears to examine the thyroid nodule. Liquid-based cytology (LBC) is a useful alternative method, as FNA could then be performed without ROSE. We explored the feasibility of using LBC without ROSE in thyroid FNA in this prospective study.

**METHODS** A total of 36 thyroid FNA biopsies were conducted in collaboration with an endocrine surgeon over a four-month period. The aspirated materials were rinsed directly into ThinPrep Cytolyt solution and one LBC slide was prepared for each case. The findings were categorised according to the Bethesda system for reporting thyroid cytology.

**RESULTS** The thyroid FNA cytology categories were as follows: non-diagnostic (n = 0, 0%); benign (n = 33, 91.7%); atypia of undetermined significance (n = 2, 5.6%); follicular neoplasm (n = 0, 0%); suspicious for malignancy (n = 1, 2.8%); and malignant (n = 0, 0%).

**CONCLUSION** Our results correlated well with the published data and demonstrated that reporting of thyroid FNA cytology was not compromised by using LBC without ROSE. Furthermore, incorporating LBC into our practice has allowed us to prioritise ROSE service to endobronchial ultrasonography-guided transbronchial needle aspiration of mediastinal lesions and endoscopic ultrasonography of the pancreas.

## CATEGORY: CLINICAL RESEARCH (ALLIED HEALTH)

AHF16CA006

## Inappropriate medication use in nursing home residents and its association with healthcare consequences

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**INTRODUCTION** Elderly nursing home residents often have multiple comorbidities, resulting in polypharmacy. Inappropriate medications may be prescribed to these residents, which may increase the risk of adverse drug events. Adverse drug events may result in emergency department visits or hospitalisations, and pose a burden to the healthcare system. The objective of this study was to assess the prevalence of inappropriate medication use in nursing homes receiving pharmacy services from Khoo Teck Puat Hospital and to evaluate its association with health consequences.

**METHODS** A retrospective review of 760 residents aged ≥ 65 years from nursing homes was performed. The residents' demographic information, comorbidities and medication prescriptions were collected. Inappropriate medications were identified using the 2012 American Geriatrics Society Beers Criteria. Records on hospitalisation and emergency department visits for each patient were

retrieved from the electronic health records. Logistic regression was performed to evaluate the association between drug use and health consequences.

**RESULTS** We found that 36% of residents were on at least one potentially inappropriate medication. There were significant associations between inappropriate antipsychotic use and repeat hospitalisations (OR 1.823, 95% CI 1.043–3.184), and between the use of more than two inappropriate medications with repeat emergency visits (OR 2.434, 95% CI 1.033–5.732).

**CONCLUSION** Based on the study results, inappropriate medication use in nursing home residents appears to be common. Unnecessary antipsychotic use and excessive use of inappropriate medications may result in increased healthcare utilisation. Deprescribing algorithms and prescribing guidelines may aid in reducing the use of inappropriate medications in nursing home residents.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP008

## Analysis of 62 cases of pars plana vitrectomy surgery: a single-injection sub-Tenon's block, a single anaesthetist and a single surgeon in a single unit

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**INTRODUCTION** Pars plana vitrectomy (PPV) surgery may involve several combined procedures, which makes the duration of

surgery prolonged and unpredictable. Cannula-based (sub-Tenon's) blocks, which are safer than needle-based blocks, are commonly



employed in PPV surgeries. The optimal anaesthetic agent volume and strength differs for sub-Tenon's block, and the main concern is the duration of ophthalmic anaesthesia and the possible need for supplementary injection (up to 89% based on the published literature).

**METHODS** With ethics approval, we retrospectively analysed 62 patients with sub-Tenon's injection presenting for complex PPV surgery. This data was obtained from the perioperative electronic database (OTSys, Medisys) over a two-year period (2015–2016).

**RESULTS** The mean duration of surgery was 87.7 (range 45–170) minutes, which is comparable with data from previous published studies. Supplementary injection was required in 29% of patients, which is much lower than that from previous published studies. Among the 62 patients, 32% required intraoperative sedation. The surgeon was satisfied with the anaesthetic technique in all patients.

**CONCLUSION** Our retrospective audit showed that a single inferonasal sub-Tenon's injection with 6 mL 2% lidocaine and 10 IU/mL hyaluronidase, aided by an intraocular pressure-lowering device, provides satisfactory anaesthesia for complex PPV surgery.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP009

## Use of the LMA ProSeal™ is associated with less intraoperative problems: a prospective observational study

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**INTRODUCTION** The use of supraglottic airway during general anaesthesia (GA) has become a common and reliable practice, as it obviates complications associated with muscle relaxants and tracheal intubation. Intraoperative problems (e.g. laryngospasm, bronchospasm, desaturation, suboptimal placement, dental and airway traumas) and postoperative complications (e.g. sore throat, hoarseness of voice, dysphagia, numbness) have been reported. The aim of this study was to investigate the incidence of intraoperative problems associated with different supraglottic airways and to detect any risk factors associated with postoperative complications.

**METHODS** We performed an ethics board-approved prospective observational study over a seven-month period on patients undergoing GA. Airway and anaesthesia management was performed at the discretion of the anaesthesiologist in charge. Data collected was analysed using SPSS Statistics.

**RESULTS** 1,391 (45.3%) patients had a supraglottic airway inserted. The LMA ProSeal™ was used in 1,136 (81.7%) patients, the LMA Supreme™ in 184 (13.2%) patients and other supraglottic airways in 71 (5.1%) patients. The use of supraglottic airways other than the LMA ProSeal™ was found to result in more intraoperative problems compared to the use of the LMA ProSeal™ (univariate analysis: OR 1.94, 95% CI 1.14–3.32;  $p = 0.015$ ; multivariate analysis: OR 1.97, 95% CI 1.10–3.54;  $p = 0.023$ ). Postoperative complications increased by 5% with every ten-minute increase in surgical duration ( $p = 0.020$ ).

**CONCLUSION** The LMA ProSeal™ was introduced in 2000 and remains the most popular choice (81.7%) despite the emergence of newer supraglottic airways. Intraoperative problems were lower with the LMA ProSeal™. Increased duration of surgery was associated with more postoperative complications.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP010

## Diagnostic and prognostic value of radiographic imaging in open globe injuries

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**INTRODUCTION** The aim of this study was to evaluate the diagnostic sensitivity and prognostic value of X-ray and orbital computed tomography (CT) imaging for open globe injuries in the acute trauma setting.

**METHODS** A retrospective chart review was performed on consecutive patients who had surgical repair of open globe injury from January 2010 to June 2015 at a teaching general hospital in Singapore. Patients who had ocular or orbital radiographic imaging (X-ray or CT) performed at the emergency department had their imaging results compared with the intraoperative findings during surgical repair. For both modalities, sensitivity, specificity and area under the receiver operating characteristic curve values were calculated to detect globe rupture and the presence of intraocular foreign bodies (IOFB).

**RESULTS** 83 patients with open globe injuries were identified – 18 had X-ray and 67 had CT performed in the acute trauma setting. CT was more sensitive than X-ray in identifying globe rupture (85.4% vs. 0%) and IOFB (96.7% vs. 75.3%). Open globe injuries detected on imaging had significantly poorer final visual outcomes (postoperative vision < 6/120) than those that were radiologically interpreted per standard practice.

**CONCLUSION** In the acute trauma setting, CT imaging of the orbits demonstrates good diagnostic sensitivity for the detection of both globe rupture (85.4%) and IOFB (96.7%). X-ray is sensitive in the identification of intraocular foreign material (75.3%) but not in detecting globe rupture (0%). Evaluation of open globe injuries by radiographic imaging is a useful adjunct to clinical examination.



## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP012

## Predictors of visual outcome in open globe injuries

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**INTRODUCTION** The aim of this study was to identify preoperative variables that prognosticate final visual outcome of open globe injuries after surgical repair.

**METHODS** A retrospective chart review was performed on consecutive patients who had surgical repair of open globe injuries from January 2010 to June 2015 at a general teaching hospital in Singapore. Univariate logistic regression analysis was performed on the following preoperative variables: factors listed in the Ocular Trauma Score (including presenting visual acuity [VA], mode of injury, the presence of afferent pupillary defect, retinal detachment or endophthalmitis); time between injury and surgery; number of surgeries; postoperative complications; and concomitant involvement of ocular and extraocular structures.

**RESULTS** A total of 83 patients with surgically confirmed open globe injuries were identified. Six months after surgical repair, 53.0%

of the patients achieved best-corrected vision of  $\geq 6/12$ , while visual outcomes remained poor ( $\leq 6/36$ ) in 29.3% of patients. Ocular trauma involving the visual axis ( $p = 0.048$ ) or associated with hyphaema ( $p < 0.001$ ), vitreous loss ( $p = 0.003$ ) or endophthalmitis ( $p = 0.027$ ) correlated significantly with post-repair visual impairment. Patients who presented with poor initial vision ( $p < 0.001$ ) or had multiple surgeries ( $p = 0.006$ ) were also more likely to suffer from poor visual outcomes. Interestingly, positive identification of open globe injury on radiographic imaging was also associated with poorer visual prognosis ( $p = 0.016$ ).

**CONCLUSION** Open globe injuries are often a preventable cause of permanent visual impairment and visual loss, although our results showed that VA can still be improved to  $\geq 6/12$  in more than half of our cases.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP013

## The sensitivity and specificity of faecal calprotectin in the Singaporean population

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**INTRODUCTION** Faecal calprotectin (FC) is a biochemical stool test that has been demonstrated to be useful in diagnosing inflammatory bowel disease and other significant colonic pathology. However, studies to date have been based on predominantly Western populations, with scant data available for Asians. The aim of this study was to assess the diagnostic performance of FC for colonic pathology in the Singaporean population.

**METHODS** Patients were recruited consecutively from colorectal and gastroenterology clinics and wards. Stool specimens were collected within a mean duration of  $8.8 \pm 14.1$  days of the colonoscopy. Clinical data was obtained from patient records. FC was measured using the BÜHLMANN CALEX® enzyme-linked ELISA test kit. Analysis of our interim results was carried out using SPSS Statistics version 21.

**RESULTS** Out of 270 patients, 124 (46%) had a normal colonoscopy or non-inflammatory pathology (NIP), while 146 (54%) had inflammatory pathology (IP). The mean FC level of patients who had NIP was significantly lower than those who had IP ( $88.4 \pm 130.2$  µg/g vs.  $262.5 \pm 244.5$  µg/g;  $p < 0.001$ ). The area under the receiver operating characteristic curve for FC diagnosing IP was 0.732 (95% CI 0.673–0.791;  $p < 0.001$ ). The optimal cut-off was 60 µg/g, which corresponded to a sensitivity and specificity of 72.6% and 64.5%, respectively.

**CONCLUSION** Our interim results showed that FC has moderate diagnostic performance in determining the presence of significant inflammatory colonic pathology. Further refinement by identifying possible confounders may help improve the accuracy of this assay.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP014

## Femoral tunnel and graft lengths in anterior cruciate ligament reconstruction: early results of a magnetic resonance imaging and patient clinical outcome study

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**INTRODUCTION** The aim of this study was to compare differences in clinical outcomes and graft failure rates between different

femoral tunnel and graft lengths in anterior cruciate ligament (ACL) reconstruction.

**METHODS** A total of 12 patients undergoing standard ACL reconstruction were prospectively recruited for this study over a six-month period. The patients underwent ACL reconstruction by a single surgeon using the anteromedial transportal technique. They were divided into Group A (femoral tunnel lengths > 36 mm) and Group B (femoral tunnel lengths ≤ 36 mm). Magnetic resonance (MR) imaging was done at nine months postoperatively to assess the status of the graft. The Tegner Lysholm Knee Scoring Scale and the International Knee Documentation Committee (IKDC) Subjective Knee Evaluation Form scores before and 12 months after the surgery were recorded.

**RESULTS** The median increase in IKDC score was greater in Group B than in Group A (24.2 vs. 15.5). Similarly, the median increase in the Tegner Lysholm Knee Scoring Scale score was higher in Group B than in Group A (34.5 vs. 21.5). However, the Kruskal-Wallis test showed that there was no statistical difference in improvement scores between the groups. MR imaging findings revealed one case of postoperative graft rupture in Group A. There was no reported graft rupture or loosening among Group B patients.

**CONCLUSION** Our study did not demonstrate differences in clinical score improvements between the long and short femoral tunnel groups.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP015

## Impact of perioperative hypoglycaemia in diabetic patients undergoing colorectal surgery

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**INTRODUCTION** This study explored the association between perioperative hypoglycaemia and surgical outcomes in patients with diabetes mellitus undergoing colorectal surgery.

**METHODS** We performed a retrospective review of 149 patients with type 2 diabetes mellitus who underwent colorectal surgery between 2015 and 2016. Perioperative glucose levels, glycated haemoglobin (HbA1c) measurements (within three months of surgery) and surgical complications based on the Clavien-Dindo classification were analysed.

**RESULTS** The mean age of the patients was 67 ± 11.2 years. Perioperative hypoglycaemia was found in 7.4% of the patients. The mean HbA1c level of patients with ≥ Grade II surgical complications was higher than that of patients with Grade I surgical complications or no complications (7.6% ± 2.5% vs. 7.0% ± 1.1%; p = 0.008). A similar finding was observed in the mean HbA1c level of patients with

≥ Grade III surgical complications when compared with patients with ≤ Grade II surgical complications (8.2% ± 3.9% vs. 7.2% ± 1.5%; p = 0.001). Adjusted multivariate analysis showed that hypoglycaemia was significantly associated with ≥ Grade II surgical complications (OR 18.9, CI 2.23–162; p = 0.007). Preoperative hypoglycaemia was associated with ≥ Grade II surgical complications (OR 10.7, CI 1.22–94.1; p = 0.032). Suboptimal glycaemic control (HbA1c > 8.0%) was significantly associated with ≥ Grade II complications (OR 2.48, CI 1.04–5.91; p = 0.040), but not with ≥ Grade III complications (OR 1.50, CI 0.450–4.98; p = 0.510).

**CONCLUSION** Perioperative hypoglycaemia is associated with adverse surgical outcomes in diabetic patients undergoing colorectal surgery. HbA1c is an independent predictor for adverse surgical outcomes. Prevention of hypoglycaemia and optimal glycaemic control may improve surgical outcomes.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP016

## An institutional review of oesophago-gastric malignancy management

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**INTRODUCTION** Although the incidence of oesophageal and gastric cancers is declining in Singapore, early cancer presentation remains low despite improved access to specialist upper gastrointestinal (GI) surgeons. In this study, we audited all upper GI cancers managed in our institution.

**METHODS** This study analysed data obtained from an ongoing prospective data collection from the Sunrise Clinical Manager and National Electronic Health Record. Specifically, the results of hospital episodes from August 2015 to May 2016 were analysed.

**RESULTS** There were 39 cases of upper GI cancers (mean age of patients 67.5 years; male to female ratio 32:7). Out of the 39 patients, 12 presented with upper GI bleed (mean haemoglobin 8 g/dL). The

39 cases consisted of oesophageal (n = 8), junctional (n = 8) and gastric (n = 21) cancers, and cancer recurrence (n = 2). Diagnostic oesophagogastroduodenoscopy (OGD) and biopsies showed squamous cell carcinomas (all oesophageal) (n = 5) and adenocarcinomas (n = 30). *Helicobacter pylori* status was positive in two out of 21 cases. Staging computed tomography showed that seven patients had metastatic malignancy (M1), while 17 patients had pathological nodal disease by size criteria (N1–3). Positron emission tomography (3/6), endoscopic ultrasonography (1/2) and staging laparoscopy (3/5) upstaged the disease to M1. Three cases were successfully treated with endoscopic mucosal resections and eight had curative gastrectomies. Palliative procedures performed included oesophageal stents, partial

gastrectomy, gastrojejunal bypass, gastrostomy feeding tube insertion, biliary stents and resection of obstructing metastatic lesion. There were 11 cases of cancer-specific deaths. The remaining 28 patients were either disease-free or still undergoing oncology treatment.

**CONCLUSION** Upper GI malignancy remains a challenging disease to manage due to their late presentation in older patients and poorer prognosis. OGD is the key to detection of the early stage of this malignant condition, which is amenable to endoscopic and curative surgeries.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP017

## Signs of magnetic resonance (MR) mammography: the MR mantra to differentiate benign and malignant breast lesions

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**INTRODUCTION** Magnetic resonance mammography (MRM) is a promising tool for the analysis of breast lesions. This study aimed to enumerate the most common 'morphological MR imaging signs' (introduced by Kaiser) that increase the sensitivity and specificity of MRM to differentiate malignant from benign breast lesions.

**METHODS** A total of 30 MRM-detected breast lesions were retrospectively evaluated, and the 'Kaiser's signs' were identified and described. Kaiser's MRM study protocol were as follows: precontrast T1-weighted imaging; dynamic contrast-enhanced imaging at one, two and seven minutes with and without subtraction; short-tau inversion recovery; and T2-weighted imaging using a 1.5T MR imaging dedicated phased array breast coil and standard Kaiser's image hanging protocol. Weighing factor was used for each sign, defined as the logarithm of the ratio of the prevalence of a sign in malignant versus benign lesion.

Sign factor indicated the presence or absence of a sign. Quantitative analysis was done using identification factor, which represents the sum of the products of weighing and sign factors. The percentage of likelihood of malignancy was established and compared with histopathological results.

**RESULTS** In addition to the standard MR assessment, Kaiser's hallmark MRM signs (such as internal enhancement, margins, intact ligament sign, oedema sign, etc) significantly increased the positive predictive value of malignant lesions.

**CONCLUSION** Applying important MRM signs with kinetic curve analysis increases the sensitivity and specificity of MRM. Standardised MRM procedure and image hanging protocol improve the perception and analysis of the important signs, thereby enabling faster and more accurate diagnosis.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP018

## Comparative analysis of endoscopic pilonidal sinus treatment (EPSiT) and non-EPSiT therapies for treatment of pilonidal disease in an Asian patient cohort

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**INTRODUCTION** Endoscopic pilonidal sinus treatment (EPSiT) is a new procedure for the treatment of pilonidal disease (PD). This study aimed to compare patients' quality of life (QoL) after undergoing different treatments for PD. The treatments administered to patients were EPSiT and non-EPSiT procedures, such as incision and drainage, Karydak's flap, Bascom's operation or excision.

**METHODS** We conducted a review of 36 patients who were treated for PD in a single institution. The patients' data was obtained from a prospectively collected database. Of the 36 patients, 15 were treated with EPSiT and 21 were treated with a non-EPSiT procedure. A QoL questionnaire was created and phone interviews were conducted to

collect patients' satisfaction levels for the surgical treatment administered to them.

**RESULTS** No difference was seen in the patients' level of satisfaction ( $p = 0.49$ ) and the postoperative scar ( $p = 0.17$ ) between EPSiT and non-EPSiT procedures. However, there was a statistically significant difference in the recurrence rate ( $p = 0.04$ ) between the two types of treatment techniques.

**CONCLUSION** Our preliminary analysis indicated that the QoL of patients treated with EPSiT and non-EPSiT procedures does not vary significantly. However, recurrence rates are lower in patients who have undergone EPSiT.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP019

## Hydrocele of the canal of Nuck: preoperative diagnosis, surgical management and literature review

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Hydrocele of the canal of Nuck is a rare condition occurring in adult females. It is caused by a failure of complete obliteration of the canal of Nuck. It may be likened to a patent processus vaginalis in a male patient. In most cases, the diagnosis of hydrocele of the canal of Nuck is made

during surgery, as it is often mistaken for an inguinal hernia. We report a case where the diagnosis was made preoperatively on imaging. The salient clinical features, radiological images for accurate diagnosis and surgical management are discussed, and the medical literature is reviewed.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP020

## A retrospective comparison of single-shot transversus abdominis plane (TAP) block with patient-controlled analgesia opioid supplementation versus TAP catheter infusion for postoperative analgesia in patients undergoing abdominal surgery

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**INTRODUCTION** Abdominal surgeries can cause significant postoperative pain. Multimodal analgesia with transversus abdominis plane (TAP) blocks has been shown to improve patient outcomes. The aim of this study was to compare the analgesic efficacy of TAP catheter infusions and single-shot TAP blocks with systemic opioids.

**METHODS** We conducted an ethics board-approved retrospective observational study on all patients undergoing abdominal surgeries who received a single-shot or continuous TAP block over a year. Data was extracted from case notes, pain management forms and the computerised operating theatre system database. Patients' baseline characteristics, postoperative pain scores, opioid usage, side effects and complications were analysed.

**RESULTS** Out of 112 patients, 69 received the single-shot technique and 43 had continuous infusions via TAP block catheters. The pain

scores at rest on postoperative Days (PODs) 1–3 and dynamic pain score on POD 1 were similar for both groups. However, the dynamic pain scores were higher for the single-shot group than for the continuous group on POD 2 ( $p = 0.02$ ) and POD 3 ( $p = 0.005$ ). More patients had opioid-related side effects in the single-shot group. The incidence of catheter-related complications, such as leaking, migration and disconnections, were low (2.3%–4.7%). About 10.7% of the patients in the single-shot group required a repeat block as rescue analgesia.

**CONCLUSION** Our study showed that the continuous TAP catheter was more effective in dynamic pain control compared to the single-shot TAP block on PODs 2 and 3, when patients are expected to start mobilising. The low incidence of catheter-related complications also suggests the safety of the continuous TAP catheter technique.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP021

## A low-cost, fast and accurate technique for patient-specific acrylic cranioplasty using 3D-printed aluminium mould

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**INTRODUCTION** Cranioplasties are frequently performed in patients with skull defects after craniectomies for various indications. Precise cranioplasty is important for good cosmetic results, as well as for protection of the brain and restoration of cerebral haemodynamics. However, patient-specific cranioplasties using synthetic implants are often expensive and require weeks of advance preparation. We report our technique of using 3D-printed aluminium mould as an accurate, economical and time-saving way to perform patient-specific acrylic cranioplasty.

**METHODS** Skull defect was reconstructed from post-craniectomy computed tomography (CT) images, and a corresponding aluminium mould was fabricated using 3D-printing technology. The aluminium mould was sterilised, and intraoperatively, acrylic bone cement was mixed and allowed to set. Once solidified, the acrylic implant was removed from the mould and edges were smoothened. Cranioplasty was performed using the standard method and the implant was secured with titanium plates and screws. Postoperative CT was obtained and

the cranial index of symmetry (CIS) was calculated using the technique previously described.

**RESULTS** The cost of the mould and raw materials to produce the acrylic implant was one-third of the cost of a patient-specific synthetic implant in the market. The time taken to obtain the customised aluminium mould from the day of decision for cranioplasty was

shorter than the average time required for a patient-specific synthetic implant to arrive (7 vs. 21 days). Average CIS score was > 95%, which confirmed that good symmetry was achieved with our cranioplasty technique.

**CONCLUSION** Cranioplasty using an acrylic implant fashioned from a 3D-printed aluminium mould is quick, accurate and cost-effective.

**CATEGORY: CLINICAL RESEARCH (PHYSICIAN)****AHF16CP022**

## Suitability of enhanced recovery after surgery protocols for elderly patients

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**INTRODUCTION** Enhanced recovery after surgery (ERAS) provides a multimodal approach to postsurgical recovery, seeking to reduce a patient's stress response and promoting recovery. This study aimed to determine the suitability of ERAS protocols for elderly patients aged > 75 years.

**METHODS** This is a retrospective analysis of all patients who had undergone major colorectal resections under ERAS protocols in Khoo Teck Puat Hospital, Singapore and Siriraj Hospital, Thailand, between 2013 and 2014. Data collected included patient characteristics and outcomes, including duration of hospitalisation and day of first mobilisation or flatus.

**RESULTS** Of the 196 patients studied, 38 were aged > 75 years. Elderly patients were more likely to have more comorbidities, and

higher American Society of Anesthesiologists (ASA) and POSSUM (Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity) scores. They were also shown to have an increased risk of developing Clavien-Dindo Grade II complications (OR 2.41, 95% CI 1.10–5.29). Compared to their younger counterparts, elderly patients did not have a delay in first flatus or mobilisation. However, they tended to stay in the hospital for a longer duration (7.89 days vs. 5.16 days;  $p < 0.001$ ). On multivariate analysis, ASA score  $\geq 3$  was an independent risk factor for a length of hospital stay > 1 week; however, age was not.

**CONCLUSION** This study has shown that elderly patients achieve comparable functional recovery under an enhanced recovery approach. ERAS can be adopted regardless of a patient's age.

**CATEGORY: CLINICAL RESEARCH (PHYSICIAN)****AHF16CP023**

## The analgesic effectiveness of a femoral nerve block for anterior cruciate ligament repair

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**INTRODUCTION** The analgesic effectiveness of femoral nerve blocks (FNBs) for anterior cruciate ligament (ACL) reconstruction is controversial. Published reports of pain scores following surgery are in disagreement. We aimed to clear up this dispute by reviewing pain scores of consecutive ACL cases over one year.

**METHODS** Patients who underwent ACL repair belonged to either of two groups: Group A patients received peripheral nerve block combined with a general anaesthetic; Group B patients received only a general anaesthetic. We hypothesised that FNB would decrease postoperative post-anaesthesia care unit pain scores and perioperative morphine consumption. All patients were offered a nerve block under ultrasonography guidance. Of 148 patients, 87 had a nerve block (Group A) and 60 did not (Group B). 7 (11%) patients from Group B initially refused preoperative FNB, but subsequently

requested for one due to intractable pain.

**RESULTS** The patients in the two groups were similar in age, gender, American Society of Anesthesiologists score and duration of operation. General anaesthesia was given to 147 of the 148 patients. One patient received a spinal anaesthetic and was excluded from our analysis. The median highest pain scores were not statistically significant between Groups A and B. However, morphine consumption in Group B was statistically significant. Nevertheless, seven patients from Group B required rescue FNB for breakthrough pain.

**CONCLUSION** FNB provides no additional benefit with respect to pain scores when a multimodal regimen of morphine, paracetamol and nonsteroidal anti-inflammatory drugs were preemptively given during the intraoperative period.



## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP024

## Incidence and anatomical distribution of hand tumours: a Singapore study

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**INTRODUCTION** Hand tumours are frequently encountered in clinical practice. A list of differential of the most common hand tumours based on anatomical location is helpful in a clinician's approach. We aimed to determine the anatomical distribution of hand tumours in a hand surgery practice in Singapore.

**METHODS** Records of 50 men and 65 women aged 17–74 (mean 41.7) years who underwent excision of hand tumours between June 1, 2010 and December 31, 2012 were reviewed. Histological diagnosis and anatomical location of the tumours were analysed. The locations were divided into three main groups: distal to the metacarpophalangeal joints (MCPJs); between MCPJs and carpo-

metacarpal joints (CMCJs); and between CMCJs and the radiocarpal joint (RCJ).

**RESULTS** Overall, the most common tumours excised from the hand were ganglions (66/119, 55.5%), followed by giant cell tumours of the tendon sheath (GCTTS) (11/119, 9.2%). However, GCTTS (n = 11/39, 28.2%) were more common than ganglions (7/39, 17.9%) distal to the MCPJ. Most of the ganglions (59/66, 89.4%) arose from between the CMCJs and RCJ.

**CONCLUSION** Most hand tumours are benign. The most common tumours – those between the CMCJs and RCJ – are ganglions, while those that are distal to the MCPJs are GCTTS.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP025

## Binge drinking-associated gastrointestinal and abdominal emergencies

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**INTRODUCTION** With today's modern lifestyle, more people, particularly youngsters, are getting into the habit of social drinking. Binge drinking has become a modern epithet for drinking alcohol, greatly overlapping with social drinking. It can be defined as heavy episodic drinking with the primary intention of becoming intoxicated by heavy consumption of alcohol over a short period of time. By highlighting the acute gastrointestinal (GI) and abdominal complications of binge drinking, this study aimed to educate people of all ages of the potential health hazards of indulging in binge drinking. We also discuss the role of contrast-enhanced computed tomography (CECT) in diagnosing these emergencies and describe their imaging features.

**METHODS** We performed CECT on patients of acute abdomen who had a history of binge drinking. The imaging findings of all such cases

of acute GI and abdominal conditions were reviewed and correlated with the common aetiological cause of binge drinking.

**RESULTS** The following acute GI and abdominal conditions were detected and their imaging features described: acute pancreatitis; vomiting-induced acute abdominal apoplexy; Boerhaave syndrome; visceral perforation causing pneumoperitoneum; and intraperitoneal bladder rupture.

**CONCLUSION** Binge drinking is a major public health issue associated with life-threatening GI and abdominal emergencies. Prompt diagnosis is of utmost importance to provide the earliest surgical treatment. Thus, imaging plays a lifesaving role in these patients. Through this educative tool, we hope to increase awareness of the hazards of this harmful habit.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP026

## Prevalence of latanoprost intolerance and subsequent travoprost tolerance in a Singaporean population

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**INTRODUCTION** This study aimed to compare the prevalence of latanoprost (Xalatan) intolerance in the local population and the proportion of those who could not tolerate travoprost (Travatan Z). Latanoprost was the first-choice prostaglandin analogue in Khoo Teck Puat Hospital (KTPH) due to government subsidies. Travaprost was second in line if patients were unable to tolerate latanoprost. Travatan Z, unlike Xalatan, does not contain benzalkonium chloride, which can cause ocular irritation, allergy or toxicity.

**METHODS** A retrospective review was done on patients who were prescribed Travatan Z and Xalatan in KTPH from November 2011 to November 2014. Those who stopped Xalatan or were prescribed Travatan Z were reviewed. The following information was extracted: date on which Xalatan or Travatan Z was prescribed; and reasons patients were on Travatan Z.

**RESULTS** A total of 1,488 and 92 patients were prescribed Xalatan and Travatan Z, respectively, during the study period. Of the 1,488

patients on Xalatan, 30 (2%) patients were intolerant due to conjunctival hyperaemia and were switched to Travatan Z. We found that 26/29 (90%) patients were successfully switched to Travatan Z from Xalatan. The remaining 3/29 (10%) patients experienced hyperaemia with both Xalatan and Travatan Z, and were switched to an alternative anti-glaucoma therapy. Of the 92 patients who were prescribed

Travatan Z, 35 (38%) did not have available medical notes and 27 (29%) were prescribed Travatan Z by physicians from other units.

**CONCLUSION** Xalatan is generally well tolerated in our patient population with a low intolerance rate of 2%. Patients who experience hyperaemia or irritation with Xalatan can be successfully switched to Travatan Z most of the time (90%).

#### CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP027

## Incidence of low anterior resection syndrome within a single institution in Singapore

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**INTRODUCTION** Low anterior resection syndrome (LARS) is an important and under-reported complication that occurs after rectal resection. This study aimed to look at the incidence of LARS within a single institution in Singapore.

**METHODS** All patients who had undergone rectal resection and colorectal anastomosis from January 2014 to September 2015 were analysed. A telephonic survey using the validated 'low anterior resection score' questionnaire was conducted. Patients with defunctioning stoma were excluded. Mann-Whitney *U*-test and Student's *t*-test were used to determine statistical significance. *p*-value < 0.05 was deemed significant.

**RESULTS** A total of 71 patients with a mean age of 66.00 years were analysed. There was equal distribution of male (*n* = 35) and

female (*n* = 36) patients. Level of anastomosis was determined as below peritoneal reflection (*n* = 25, 35.21%) or above peritoneal reflection (*n* = 46, 64.79%). The mean LARS score for this study population was 5.52. The majority of the patients had no features of LARS (score 0–20; *n* = 65, 91.55%). Major LARS (score 30–42) was found in 2 (2.82%) patients and minor LARS (score 21–29) in 4 (5.63%) patients. No significant risk factor could be determined in the study group (*p* > 0.05).

**CONCLUSION** Published data reports LARS as a significant problem in patients with rectal resection and colorectal anastomosis. Our study shows a significantly lower rate of LARS compared to the published literature.

#### CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP028

## Prevalence of visual field defects and optic nerve fibre layer defects in patients with and without obstructive sleep apnoea

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**INTRODUCTION** This study compared the prevalence of visual field defects and retinal nerve fibre layer (RNFL) defects in Singaporean patients with and without obstructive sleep apnoea (OSA).

**METHODS** All patients admitted for non-cardiac surgery were invited for a comprehensive ophthalmological and systemic examination, including Humphrey visual field (HVF) testing and RNFL-optical coherence tomography. Known OSA patients were excluded. Patients were grouped by the apnoea-hypopnoea index (AHI): normal (AHI < 5); mild (AHI 5–14); moderate (AHI 15–29); and severe (AHI ≥ 30).

**RESULTS** A total of 90 eyes from 18 female and 27 male patients were examined. There was no statistical difference in intraocular pressure between the groups (mean 14.7 ± 2.4, *p* = 0.264). HVF mean deviation

(MD) and pattern standard deviation (PSD) worsened as AHI increased. MD was −2.1, −2.6, −3.8 and −7.7 (*p* = 0.008) in the normal, mild, moderate and severe OSA groups, respectively. PSD was 2.12, 2.23, 2.64 and 3.91 (*p* = 0.05) for the normal, mild, moderate and severe OSA groups, respectively. The average RNFL thickness in the normal group was 96.7 ± 13.1 and was thinner in the mild (86.5 ± 7.9), moderate (83.6 ± 15.0) and severe (86.2 ± 20.4) groups (*p* = 0.007). The superior and inferior RNFL quadrants were significantly thinner (*p* = 0.006 and *p* = 0.003, respectively) in the OSA groups, but the nasal and temporal RNFL quadrants were of equal thickness in all groups.

**CONCLUSION** OSA is associated with a higher prevalence of HVF and RNFL defects.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP029

## Clinical characteristics and health behaviours of patients with type 1 diabetes mellitus

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**INTRODUCTION** Approximately 5% of all diabetic patients have type 1 diabetes mellitus (T1DM). These patients are diagnosed at a younger age and have longer disease exposure. Optimal glycaemic control is difficult to achieve in these patients. We report the preliminary findings of an ongoing study on patients with T1DM.

**METHODS** A total of 116 patients (45% male; 73% Chinese, 10% Malay, 12% Indians) were recruited. A review of patients' medical records was performed, and patients completed a detailed questionnaire.

**RESULTS** Patients were diagnosed at a mean age of  $21.6 \pm 12.3$  years, had diabetes mellitus for  $14.5 \pm 10.1$  years and haemoglobin A1c (HbA1c) of  $8.3\% \pm 1.4\%$ . All patients were on insulin at a total daily dose of  $0.74 \pm 0.26$  units/kg. Only 45.3% of patients performed self-monitoring of blood glucose (SMBG) at least three times a day, as

recommended. The most commonly reported reason for not performing SMBG was that it was too troublesome (46.3%). Most patients (93.4%) took at least three insulin injections per day, and 66.7% reported never missing their insulin injections. Most patients (92.5%) reported adjusting their bolus insulin dose for food, of which 83.5% did so by carbohydrate estimation, but only 49.0% reported being familiar with carbohydrate counting and 55.7% were practising it at least daily. Patients with good glycaemic control ( $\text{HbA1c} \leq 7\%$ ) (21.1%) had higher education level, performed SMBG regularly, and were more familiar with carbohydrate counting, and practising it regularly and adjusting their bolus insulin dose based on carbohydrate estimation.

**CONCLUSION** Glycaemic control is suboptimal in patients with T1DM, and efforts to improve adherence to recommended best practices must be increased.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP030

## Computed tomography assessment of free-hand insertion of cervical lateral mass screw by modified Magerl technique in an Asian population: are facet joint breaches under-reported?

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**INTRODUCTION** Lateral mass screw (LMS) is an effective way of stabilising the subaxial cervical spine. Various techniques, including Roy-Camille, Magerl, Anderson and An, have been used for screw insertion, with risks of breaching the facet joints and injuring the nerve roots or even the vertebral artery. The purpose of this study was to analyse the incidence of facet breaches by LMS on computed tomography (CT).

**METHODS** This was a retrospective clinical study of all the cervical spine cases that were stabilised by posterior approach with LMS insertion and had postoperative CT images. The free-hand modified Magerl technique was used. Entry point was at the centre of the lateral mass with the trajectory pointing toward the superolateral corner of the lateral mass. The anatomical levels of C3 to C6 were analysed.

Statistical analyses were conducted using IBM SPSS Statistics version 22.0 (IBM Corp, Armonk, NY, USA).

**RESULTS** A total of 297 LMS in 46 patients with an overall facet joint breach rate of 12.79% was noted, with a significant difference in breaches among C3-C6 ( $p = 0.01$ ); C5 had the lowest number of breaches (10.53%) and C6 had the highest number of breaches (39.47%). We found that 28.95% of the facet breaches were at the levels outside the fusion level. None of the cases included in the study required revision for malpositioning.

**CONCLUSION** The rates of facet joint breach in this study were noted to be higher than those reported in similar clinical studies that analysed postoperative X-ray images. The most common breach was that of the inferior cervical facet joints at the C6 level.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP031

## Comparison of correction of kyphotic deformity in thoracolumbar fractures between open versus minimally invasive surgery: a single institution's experience

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**INTRODUCTION** This study aimed to evaluate the radiological outcomes of correction of kyphotic deformity in thoracolumbar burst fractures between open transforaminal lumbar interbody fusion and minimally invasive surgery (MIS).

**METHODS** Patients in our hospital with thoracolumbar burst fractures were identified and reviewed from 2010 to 2014. Baseline data (e.g. patient demographics, mechanism of injury, fracture levels involved and surgical technique used) were recorded. Correction of kyphotic deformity was calculated by comparing the Cobb angles pre- and postoperatively. Percentage of correction of Cobb angles was calculated based on the difference between preoperative and postoperative angles, divided by the preoperative angle. Radiological findings were assessed preoperatively, immediately post operation, at three months and six months post operation. Results were analysed using the SPSS statistics and independent *t*-test.

**RESULTS** There was a total of 37 cases treated for thoracolumbar burst fractures between June 2010 and July 2014. There was no statistical significant difference in radiological outcome between the two techniques. The percentages of correction of Cobb angles post MIS and open technique were 33.5% and 59.7%, respectively, which was significant ( $p = 0.03$ ). However, the outcomes at three months post MIS and open technique were 44.3% and 49.0%, respectively, which was not statistically significant ( $p = 0.735$ ). Similarly, the outcomes at six months post MIS and open technique were 46.7% and 45.1%, respectively, which was also not statistically significant ( $p = 0.916$ ).

**CONCLUSION** The results from this retrospective study suggest that in terms of radiological measurements of correction of kyphotic deformity in thoracolumbar burst fractures, there were no significant radiological differences in the outcomes between MIS and open technique on the long-term basis.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP032

## Regional citrate anticoagulation is safe and non-inferior to saline flushes in conventional haemodialysis with contraindication to heparin

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**INTRODUCTION** Saline flushes are widely adopted as the method of choice for anticoagulation in patients requiring conventional haemodialysis with contraindication to heparin. This study demonstrated the efficacy and safety of regional citrate anticoagulation (RCA) in patients receiving heparin-free haemodialysis.

**METHODS** This is a prospective, open-label, crossover study of sequential haemodialysis sessions using RCA versus saline flushes in patients receiving heparin-free haemodialysis. The inclusion criteria were: (a) haemodynamically stable with reliable vascular access; (b) haemoglobin  $\geq 7$  g/dL; and (c) no contraindication to RCA. Calcium-free dialysate was used for the patients. Trisodium citrate 15% was infused at a fixed rate according to blood flow (Qb). Returning to the patient is 10% calcium gluconate initially infused according to Qb, but subsequently adjusted according to post-dialyser ionised calcium (iCa) levels. Following assessments, we performed a visual inspection

of bubble traps/dialysis tubing for clots. Pre-dialyser, pre-citrate iCa was targeted at 0.91–1.2 mM and post-dialyser iCa was targeted at 0.25–0.35 mM. Additionally, blood samples were sent to the main laboratory at the start and end of haemodialysis for analysis of pH and total serum calcium levels. Patients were monitored for signs and symptoms of hypocalcaemia.

**RESULTS** During the study period, 23 patients (44% female) were recruited. The mean age was 53 (range 25–67) years. Most (75%) of the patients weighed 50–80 kg. Of the 23 patients, 5 (20%) had slow low-efficiency dialysis. No clots were seen in either the dialyser or lines. Other than the development of transient hypercalcaemia post haemodialysis, which resolved spontaneously, no side effects occurred.

**CONCLUSION** RCA is a safe and effective mode of anticoagulation, and should be considered as an alternative to saline flushes in heparin-free haemodialysis.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP033

## A radiographic study of proximal femur morphology in elderly patients with femoral neck fractures: is there a difference between ethnic groups?

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**INTRODUCTION** This study aimed to determine the differences in proximal femur morphology in elderly patients with femoral neck fractures among the different ethnic groups in Singapore.

**METHODS** Records of 101 men and 288 women aged 60–109 (mean 76.3) years who underwent hip hemiarthroplasty for femoral neck fractures between June 1, 2010 and December 31, 2015 were reviewed. Patients' age, gender and race were recorded. The canal-to-calcar ratio of the ipsilateral femur, and neck shaft angle, hip offset, neck length and neck width of the contralateral proximal femur were measured on plain anteroposterior radiography.

**RESULTS** Chinese females had slightly larger femoral heads

(43.88 mm) as compared to Malay females (42.92 mm) ( $p = 0.044$ ) and Indian females (42.23 mm) ( $p = 0.025$ ). Chinese females also had a significantly lower canal-to-calcar ratio (0.606) as compared to Malay females (0.664) ( $p = 0.02$ ) and Indian females (0.693) ( $p = 0.004$ ). The neck shaft angle of Chinese females ( $137.5^\circ$ ) was significantly larger than that of Indian females ( $127^\circ$ ) ( $p = 0.01$ ).

**CONCLUSION** There are statistically significant differences in the femoral head size and canal-to-calcar ratio between females of different ethnic groups. There are also differences in neck shaft angles between Chinese and Indian females and between Malay and Indian females.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP034

## Metastatic lobular breast carcinoma presenting with anal pain

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Invasive lobular carcinoma (ILC) of the breast is known to metastasise to gastrointestinal sites more frequently than invasive ductal carcinoma. This can occur many years after treatment, with only gastrointestinal signs and symptoms at presentation. We describe a case of metastatic lobular breast carcinoma presenting with anal pain. A 50-year-old Malay woman presented with a one-month history of anal pain associated with per rectal bleeding and change in stool calibre. She had a history of untreated bilateral lobular breast carcinoma. Staging computed tomography showed circumferential rectal wall thickening with multiple small-volume lymph nodes. Colonoscopy showed a stenosing low rectal tumour involving the anorectal junction, 5 cm from the anal verge. The tumour was biopsied. Magnetic resonance imaging of the rectum was also performed. A transverse loop

colostomy together with trucut biopsies of bilateral breast lumps were performed in view of the intraoperative finding of advance disease. Peritoneal fluid was sent for cytology. Histology of the breast tumours revealed a grade 2 ILC (oestrogen and progesterone receptor-positive, HER2-negative). Rectal tumour biopsies showed metastatic lobular carcinoma of the breast and peritoneal fluid cytology compatible with metastatic carcinoma. The patient was discharged on postoperative Day 6 with plans to commence palliative chemotherapy and radiotherapy. We need to encourage local patients to seek treatment when presenting with curable breast cancer. It is also important to differentiate primary colorectal cancer from metastases in patients with previously known lobular carcinoma of the breast, as the treatments differ.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP035

## Effectiveness of epidural analgesia for laparotomies in Khoo Teck Puat Hospital: a six-month retrospective audit of efficacy

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**INTRODUCTION** Major laparotomies generally herald high pain scores postoperatively and have high intraoperative haemodynamic shifts. Traditional analgesic regimens with intravenous opioids were supplanted with superior epidural analgesia (EA) in the mid-1980s. However, recent literature points to a high failure rate. The aims of this study were twofold: (a) to retrospectively audit our EA performance in

terms of success and complications; and (b) to take an in-depth look at the factors associated with failure.

**METHODS** We retrospectively reviewed charts and our EA forms over a six-month period.

**RESULTS** Our results showed a low rate of mortality and neurological morbidity. However, we have a high rate of failure of 37%,



as judged by the high pain scores and use of adjuvant analgesics, and also an unacceptably high rate of hypotension from epidural infusions, which required fluid boluses, inotropes and intensive care unit admissions.

**CONCLUSION** EA in our setting is safe but not effective, requiring

further and frequent scrutiny in terms of procedures, technical skills and education, as well as its cost effectiveness as compared to other alternatives that are less labour intensive and technically challenging. We suggest a few changes to our current practice to overcome these weaknesses.

#### CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP036

## Sulfonylurea receptor mutations and responsiveness to specific sulfonylurea (gliclazide): a pilot proof-of-concept, randomised crossover pharmacogenetic study

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**INTRODUCTION** ATP-sensitive potassium (KATP) channel is the molecular target for sulfonylurea. *In vitro* data suggests that common haplotype K23/A1369 (haplotype frequency in Asians = 0.5) of KATP channel is more sensitive to inhibition by gliclazide than glibenclamide. We hypothesised that gliclazide has greater glucose-lowering efficacy than glibenclamide in patients with type 2 diabetes mellitus (T2DM) with haplotype K23/A1369.

**METHODS** We randomised patients with poorly controlled T2DM (haemoglobin A1c [HbA1c] > 8.0% on two consecutive visits) and K23/A1369 haplotype to receive three weeks of study therapy. Patients were sequentially treated with the maximum tolerated dose of gliclazide or glibenclamide, followed by one week of washout before crossover. During washout, patients received pre-study T2DM medications. Pre- and post-meal blood glucose was measured at least three days per week. The primary end-point was glucose-lowering efficacy of the two treatment groups.

**RESULTS** A total of seven T2DM patients (six females, one male) aged 38–64 years, with a mean HbA1c of 9.0% ± 0.4%, completed the study. They were moderately obese (body mass index 30.3 ± 5.0 kg/m<sup>2</sup>). In the gliclazide group, the mean pre-meal glucose level was 8.6 ± 0.7 mmol/L, while in the glibenclamide group, the mean pre-meal glucose level was 9.1 ± 0.7 mmol/L. We observed better glycaemic control in the fasting blood glucose. This trend, although not statistically significant, was more prevalent in the gliclazide group than in the glibenclamide group (7.8 ± 2.0 mmol/L vs. 8.5 ± 1.5 mmol/L; p = 0.4). The mean post-meal glucose level was similar in both groups (10.5 ± 0.4 mmol/L vs. 10.8 ± 0.8 mmol/L). No major adverse effects were encountered.

**CONCLUSION** Our pilot pharmacogenetic study suggested an improved trend in fasting glucose level with gliclazide (as compared to glibenclamide) therapy in T2DM patients with K23/A1369 haplotype.

#### CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP037

## The SAFER Lasso: a novel approach using point-of-care ultrasonography to evaluate patients with abdominal complaints in the emergency department

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**INTRODUCTION** Ultrasonography is a useful imaging modality to evaluate patients presenting to the emergency department with abdominal complaints. While there are attempts to conceptualise a systematic approach using point-of-care ultrasonography (POCUS), to the best of our best knowledge, there is no literature describing how it could be performed in a focused manner.

**METHODS** Drawing on our clinical and teaching experience, we developed a focused (SAFER) and systematic (Lasso) framework to evaluate patients with abdominal complaints using POCUS.

**RESULTS** The evaluation of an organ begins with 'Size', followed

by 'Air' and 'Fluid', which is either free in the adjacent peritoneum or trapped within the organ. 'Echogenicity' should be homogeneous in solid organs and follow a sequence of increasing echogenicity from renal parenchyma, liver, spleen, pancreas to renal sinus. Evaluation of the organ ends with 'Regional lesion', either as a discrete mass, cyst or calcification, or indiscreetly as a distortion of the normal organ contour. 'Lasso', a loop of rope that is designed to be thrown around a target and tightened when pulled, directs the sequence of the scan. We started at the epigastrium with the left liver lobe, stomach, inferior vena cava and pancreas, followed by the right liver lobe,

gallbladder, biliary tract and right kidney. Next were the spleen, left kidney, abdominal aorta, small bowels, pelvic organs and appendix, and finally, the large bowel.

**CONCLUSION** The SAFER Lasso is a focused and systematic approach for abdominal evaluation using POCUS. More research is required to evaluate its clinical and educational impact.

**CATEGORY: CLINICAL RESEARCH (PHYSICIAN)**

**AHF16CP038**

## Radiographic measurements of olecranon processes in an Asian population: clinical significance in fixation of comminuted olecranon fractures

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**INTRODUCTION** This study aimed to identify a clinically relevant and intraoperatively accessible measurement of the olecranon process, so as to achieve better fixation of comminuted olecranon fractures.

**METHODS** A total of 600 lateral elbow X-rays were studied. Parameters that were examined included the olecranon height (OH) and trochlear distance (TD), and the ratio between the two (TD:OH) was calculated.

**RESULTS** The mean OH was  $21.93 \pm 2.44$  mm, the mean TD was  $21.93 \pm 1.87$  mm, and the mean TD:OH ratio was  $1.00 \pm 0.078$ .

**CONCLUSION** Fractures of the olecranon process are common and are often comminuted, requiring surgical fixation. Anatomical reduction of such fractures are a challenge, as there are few objective parameters that can be used intraoperatively. The TD:OH ratio of 1.00 is a useful parameter to help surgeons in achieving optimal fixation.

**CATEGORY: CLINICAL RESEARCH (PHYSICIAN)**

**AHF16CP039**

## Clinically efficacious dosing of sugammadex in a difficult airway scenario

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Newly introduced in Singapore, sugammadex is a modified cyclo-dextrin that forms tight complexes and acts as a binding agent with steroidal neuromuscular-blocking drugs. It encapsulates free agents in plasma, terminating neuromuscular blockade. The cost is prohibitive for routine usage. Nevertheless, sugammadex is potentially useful in the cannot-intubate-cannot-oxygenate difficult airway scenario. The optimal dose has been debated in the literature and mooted to be

16 mg/kg. We present a case of difficult airway with failed intubation, failed supraglottic airway and unstable mask ventilation in a severely obese patient scheduled for elective bariatric surgery. As per international difficult airway guidelines, the patient was woken up and the procedure rescheduled for patient safety. We found that a 4 mg/kg dose was clinically efficacious for decurarisation, and neuromuscular blockade was reversed within one minute of drug administration.

**CATEGORY: CLINICAL RESEARCH (PHYSICIAN)**

**AHF16CP040**

## Is knee brace needed after meniscus repair?

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**INTRODUCTION** Rehabilitation protocols for meniscus repair remain controversial. Most surgeons limit knee flexion by bracing, possibly delaying return to full range of motion. Our study aimed to evaluate the results of a rehabilitation programme that forgoes postoperative knee brace and allows full range of motion as tolerated.

**METHODS** A total of 18 patients who underwent arthroscopic meniscus repair for isolated meniscus tears from 2013 to 2015 in our hospital met the inclusion criteria. Patients with concomitant ligament or cartilage injury and fractures were excluded. All patients participated in a rehabilitation protocol, which included partial weight-bearing, as tolerated, without knee brace or restrictions on postoper-

ative knee range of motion. Data collected included patient biodata and meniscus tear characteristics. Parameters including pre- and postoperative pain scores and knee range of motion were documented. Lysholm knee scores and Tegner activity scales were administered to patients at an average of 13 months post surgery to evaluate subjective outcomes. Healing of the meniscus tear is defined as absence of knee pain after surgery.

**RESULTS** Patients demonstrated improved postoperative range of motion, although this was not statistically significant. This is likely because most patients did not have significant limited range of motion preoperatively. There is statistically significant improvement in postop-

erative pain scores and Lysholm scores. Among the patients, 72% achieved their baseline Tegner scales, and 89% had no recurrence of pain at an average of three months post surgery.

**CONCLUSION** Our case series shows that knee bracing is unnecessary after meniscus repair to achieve meniscus healing and good knee function.

## CATEGORY: CLINICAL RESEARCH (PHYSICIAN)

AHF16CP041

## Correlating findings of clinician-performed bedside thyroid ultrasonography to cytological results: a prospective study of 100 cases

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**INTRODUCTION** Evaluation of a thyroid nodule is a four-step process involving history with clinical examination, thyroid function tests, ultrasonography (US) of the thyroid and guided aspiration of cytology based on US characteristics. For an accurate clinicopathological correlation, we compared the clinician's impression of the nodule on US to guided cytology.

**METHODS** A prospective study of 100 cases were conducted over one year to determine the correlation of bedside thyroid US impression to guided fine-needle aspiration cytology (FNAC) of the thyroid nodule.

**RESULTS** Of the 100 cases, 74 were considered benign, 20 were suspicious for malignancy and six were indeterminate on US.

Overall concordance rate was 83.0%, with sensitivity and specificity of 66.0% and 90.2%, respectively. The negative predictive value was 92.5%.

**CONCLUSION** It is essential for clinicians performing bedside thyroid US and guided FNAC to document their clinical impression of the nodule and correlate it with gold standard cytology to improve their learning curve and audit their results. The use of Thyroid Imaging and Reporting Data System is akin to the Breast Imaging Reporting and Data System in breast imaging, as a risk stratification system for classifying thyroid lesions, and will henceforth be adopted in our service for evaluating thyroid nodules.

## CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA008

## A proton pump inhibitor deprescribing framework: a pharmacist-physician collaborative approach

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**INTRODUCTION** Overutilisation of proton pump inhibitors (PPIs) is prevalent globally. In Singapore, over 59 million capsules were dispensed in 2014, costing SGD 19 million. This study aimed to implement a PPI-focused deprescribing framework in the inpatient setting and to measure the success and safety of this initiative.

**METHODS** This was a prospective interventional study. Patients on PPIs for >48 hours from wards representing the top three PPI-prescribing disciplines (General Medicine, Cardiology and Geriatrics) were included and examined. Roadshows were conducted for these disciplines, during which physicians and pharmacists were made aware of the need to deprescribe PPIs and the proposed new framework. Pharmacists assessed the appropriateness of PPIs and highlighted to physicians the potential patients who were suitable to be deprescribed; the final decision lay with the physician. The success of the

framework was measured by the percentage of patients who had PPIs deprescribed. Patients whose PPIs were deprescribed were followed up for one month post discharge to monitor for gastrointestinal-related bleeding events.

**RESULTS** Out of 184 patients, 38 (21%) had PPI deprescribed, of which 23 (61%) were intervened by pharmacists and 15 (39%) were deprescribed by physicians, predominantly from General Medicine (n = 7). Of the patients who were not deprescribed, 32 (22%) were on PPIs for appropriate reasons. Of the 184 patients, 114 (62%) were on PPIs for inappropriate reasons. There were no bleeding events in patients whose PPIs were deprescribed.

**CONCLUSION** The success of deprescribing was found to be moderately low. Nevertheless, deprescription is considered safe for patients in the first month post deprescribing.

## CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA009

## Process re-engineering at the outpatient pharmacy: implementation of a medication self-order form

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**INTRODUCTION** Waiting time at the outpatient pharmacy (OP) is a key contributor to patient satisfaction, and hence, workflows at reception and dispensing must be efficient. With increased literacy, patients are taking a more active role in managing their health. In view of this, we aimed to create a medication self-order form and examine its effectiveness.

**METHODS** The form was developed and implemented in OP over two trial periods – July 2015 and November 2015. The study population included all patients who arrived at Khoo Teck Puat Hospital OP to collect medication. A total of 346 forms in Trial 1 and 1,005 forms in Trial 2 were distributed and analysed. The receptionists, typists and dispensers were required to assess the accuracy of answers to all questions on the form and assist in data collection.

**RESULTS** In Trial 1, 81% (n = 281) of patients agreed to use the form and 70% (n = 179) correctly answered the question on their knowledge of new medications. In Trial 2, 72% (n = 631) of patients correctly answered the question intended to determine patients' need for medication counselling. 50% (n = 355) of the patients answered all questions in the form correctly. The reworks rate measured in Trial 2 was 9.3% (n = 93). Using in-house baseline data collected in October 2015, there was a 34% reduction in reworks rate, amounting to 0.2 full time equivalents (FTE) saved. The amount of time saved when counselling was omitted was equivalent to 1.4 FTE.

**CONCLUSION** With improvements, there is a potential to implement a system of medication self-order.

## CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA010

## Developing a model of care for sustainable deprescribing in Khoo Teck Puat Hospital

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**INTRODUCTION** Inappropriate polypharmacy has been shown to be associated with an increased risk of adverse drug events, non-compliance and increased healthcare costs due to rehospitalisations and cost of medications. However, deprescribing and reduction of number of medications prescribed is rarely addressed and the literature on deprescribing lacks systematic details on implementation. Thus, the objective of this study was to establish a systematic and sustainable model of care for safe and effective deprescribing in a regional hospital.

**METHODS** This study described the design, implementation and reiteration of a prototype workflow for pharmacist-initiated deprescribing using a build-measure-learn feedback loop. This workflow was developed for the setting of an inpatient care team, primarily involving pharmacists and physicians. Iterations of the workflow involved streamlining the documentation process, method for identi-

fication and evaluation of medications for deprescribing, and incorporating this model into the standard workflow of an inpatient pharmacist.

**RESULTS** Two prototypes were built using the build-measure-learn feedback loop. A total of 280 patients had medications deprescribed over 16 weeks through the implementation of the final prototype workflow. Physicians accepted 91% of all the suggestions made by pharmacists, which resulted in a significant reduction in line items. The majority (86%) of medicines discontinued during admission remained deprescribed after review at a follow-up visit within one month post discharge.

**CONCLUSION** The second prototype showed a shorter time taken for each patient, further simplified processes from the perspective of pharmacists utilising the workflow and an increased capacity to deprescribe based on the same amount of resources.

## CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA011

## Improving discharge by understanding why family members hesitate to bring older patients home from the hospital

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**INTRODUCTION** Hospitals today face severe bed shortages, which can be attributed to beds occupied by physically and cognitively frail

older patients who remain in hospitals despite being out of acute illness. Family members are hesitant to bring them home, as they express

difficulties coping with their care. We aimed to explore factors contributing to family caregivers' hesitation to discharge older patients home from acute hospitals.

**METHODS** A prospective study of older patients (aged  $\geq 78$  years) admitted to a tertiary hospital geriatric unit was conducted from January 2015 to January 2016. Patients from nursing homes were excluded. Using univariate and multivariate analyses, demographic and clinical variables associated with patients whose relatives had reservations about discharging the patient home were elicited.

**RESULTS** Of the 693 patients, 76% of family members expressed issues with discharging the patient home. The patients had a mean age of  $83.3 \pm 7.1$  years, age-adjusted Charlson Comorbidity Index

score was  $5.5 \pm 1.8$  and modified Barthel Index score was  $51.8 \pm 31.1$ . Multivariate analysis controlling for potential confounding variables found that patients with dementia (OR 3.72, 95% CI 1.93–7.18) and divorced/single/widowed patients (OR 4.59, 95% CI 2.46–8.60) had higher odds of discharge problems expressed by relatives.

**CONCLUSION** In this moderately frail sample of older patients, a very high proportion of relatives expressed concerns with post-discharge care. Dementia is a risk factor, so are divorced/single/widowed patients, who are more likely to have limited family support. More infrastructural and psychosocial interventions need to be put in place to address the factors unveiled, to ameliorate this pressing problem.

#### CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA012

### Characterisation of interventions performed in the outpatient pharmacy

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**INTRODUCTION** Prescription orders in the specialist outpatient clinics currently present in different forms – electronic and manual. If an intervention is raised, documentation necessarily occurs on different mediums, making characterisation complex. This project set out to create a simplified process to consolidate reporting in a unified database, thus allowing for meaningful characterisation of recommendations made by outpatient pharmacists.

**METHODS** A staff survey was conducted to assess the challenges of reporting in a unified database. Thereafter, a process flow was introduced and tracked to determine the success of the unified database in consolidating all interventions, following which, data from October 2015 was collected and analysed.

**RESULTS** Documentation in the unified database improved from a monthly average of 36% to 81% post implementation of the new

process flow. Characterisation of recommendations made demonstrated that 85% (391/457) of recommendations made by the outpatient pharmacists led to change(s) in the prescription. Of the recommendations, those judged to have potentially averted a physician visit made up the bulk (60% [236/391]) of interventions performed. Cost-savings from all interventions was estimated to be approximately SGD 280,000 for October 2015.

**CONCLUSION** The sustained improvement in documentation to the unified database was a step toward better medication safety practices within the specialist outpatient clinics. Additionally, the high acceptance rate for suggestions posed by outpatient pharmacists greatly affirms their role in the medication supply chain. Lastly, the estimated cost avoidance reported underscores the need for continued surveillance of prescription orders.

#### CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA013

### Examining the construct validity of the Risk Assessment and Prediction Tool

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**INTRODUCTION** The Risk Assessment and Prediction Tool (RAPT) was developed to predict the discharge destination of patients post hip or knee surgery. The aim of this study was to examine the construct validity of the RAPT.

**METHODS** A total of 107 elderly patients (76.6% female) with a mean age of  $78.9 \pm 8.5$  years were analysed. Out of the 107 fracture cases, 54 were intertrochanteric fractures, 48 were neck of femur fractures and five were subtrochanteric fractures. Convergent validity was examined using the Modified Barthel Index (MBI; premorbid function) and the Clinical Frailty Scale (CFS; premorbid frailty). Discriminant validity was assessed by testing differences in postoperative function (MBI) among three groups of patients characterised by their RAPT scores.

**RESULTS** The RAPT was moderately correlated with the MBI ( $n=103$ ;  $r=0.43$ ,  $p<0.001$ ) and the CFS ( $n=96$ ;  $r=-0.55$ ,  $p<0.001$ ). Group means were significantly different as determined by one-way ANOVA ( $F[2, 82]=14.97$ ,  $p<0.001$ ). A Games-Howell post-hoc test revealed that postoperative function was significantly lower in patients who may require extended rehabilitation (Group 1;  $48.14 \pm 13.97$ ,  $p<0.001$ ) compared to patients who may need intervention to be discharged home (Group 2;  $60.76 \pm 15.53$ ,  $p<0.001$ ) and patients who may be discharged home directly (Group 3;  $75.77 \pm 9.40$ ). There were significant differences between Groups 1 and 2 ( $p=0.005$ ).

**CONCLUSION** Evidence for the construct validity of the RAPT in predicting postoperative need for rehabilitation in elderly with hip fracture is preliminary established.



## CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA014

## An intelligent community functional screening kiosk to quantify older persons' balance, gait speed and lower limb strength

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**INTRODUCTION** We developed the Intelligent Community Functional Screening (i3CFS) kiosk to obtain reliable and valid scores of the older person's lower limb physical performance to identify their risk of falls.

**METHODS** A total of 310 participants aged  $\geq 65$  years were screened using the PAR-Q+ questionnaire to establish whether they were safe to perform the three Short Physical Performance Battery (SPPB) tests, which consisted of five repeated chair stands, a 2.44 m walk test and three standing balance tests. Their performance during the three tests were simultaneously collected via the semi-automated and mobile i3CFS kiosk and via manual testing by a qualified doctor using a stopwatch. The i3CFS kiosk consists of a low-cost depth-sensing camera integrated with embedded pressure sensors to obtain time-sensitive and kinematics data.

**RESULTS** Reliability of SPPB scores from healthcare professionals who viewed the participants' physical performance from videotapes, on-site manual testing and the i3CFS kiosk were found to be highly correlated ( $r = 0.921-0.988$ ;  $p = 0.000$ ) and non-significant among the three approaches ( $t = 1.851-0.022$ ;  $p = 0.083-0.983$ ). There was a statistical difference in the five repeated chair stands scores obtained using the i3CFS kiosk and using manual testing ( $t = 3.797$ ;  $p = 0.000$ ). A Bland-Altman plot indicated strong agreement between mean scores and the differences between the two measuring approaches for the five repeated chair stands test and 2.44 m walk test.

**CONCLUSION** The i3CFS kiosk is a reliable productivity tool that can be used to conduct community functional screening. Its unique features include a set-up time of less than five minutes, semi-automation features and accurate collection of time-sensitive and kinematics data.

## CATEGORY: QUALITY IMPROVEMENT (ALLIED HEALTH)

AHF16QA015

## Potential technology innovation to transform processes in Khoo Teck Puat Hospital outpatient setting

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**INTRODUCTION** With an increasing patient load and limited manpower at outpatient clinics and the pharmacy, it is important to build a more hassle-free, value-based model for patients and staff. This study aimed to propose potential technology innovations to transform the processes at the outpatient setting to more hassle-free ones.

**METHODS** We conducted an observational series to map out patient journey, starting from post-doctor consultation in clinics to the patient leaving the hospital. Potential aspects that could be improved through technology innovations were then identified.

**RESULTS** Some of the patient experiences after doctor consultation included confusion on whether to expect paper or electronic prescription at different clinics and multiple queue points throughout the journey (e.g. waiting to make appointment, payments and pharmacy). Furthermore, patients tended to enquire about their bill, as

they were unable to view the actual invoice before making payment. As 90% of Singaporeans are smartphone users, self-help mobile applications could be developed to address these issues. At multiple queue points, patients could use the applications to: (a) view and book the next available appointment; (b) request the amount of medication they require in advance, thereby enabling the pharmacy to prepare the medication before they arrive at the pharmacy; and (c) pay their bills based on the intuitive bill displayed. An additional benefit is the potential of reducing human congestion, as they could choose to leave the hospital immediately after consultation, since the applications can be accessed anytime and anywhere.

**CONCLUSION** Further studies to explore the feasibility of these innovative designs with relevant systems are essential to determine the impact on time-saving and productivity.

## CATEGORY: QUALITY IMPROVEMENT (NURSING)

AHF16QN008

## A study on the impact of transitional care service on caregiver stress and a survey on caregiver training needs

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**INTRODUCTION** The transitional care (TC) service of Alexandra Health provides post-discharge homecare service to facilitate the transition of patients from the hospital to their homes. The TC team engages the caregivers in supporting the patients. The impact of the TC service on caregiver stress was studied and a survey on caregivers' training needs was conducted.

**METHODS** A total of 200 caregivers of patients accepted into the TC service from March 3, 2014 to December 31, 2014 were interviewed during the first TC visit concerning their caregiving needs. They completed the American Medical Association's Caregiver Health Self-Assessment Questionnaire, including the subscales for stress and health. The same questionnaire was given during the last TC visit or administered via phone call after discharge. Paired *t*-test was used to study the difference in the caregiver stress scores at the beginning and

at the end of the TC service. A descriptive analysis on the caregivers' sociodemographics and training needs was done.

**RESULTS** There is a significant reduction in the mean self-reported stress level and an improvement in self-reported health in the post-TC service survey compared to pre-TC service. In the training needs survey, 46% of caregivers reported not receiving any training. Caregivers preferred individualised or small group teaching with hands-on practice to big group lectures/seminars. Caregivers also wanted to understand more about the medical conditions of their care recipients and the healthcare services available.

**CONCLUSION** Our findings show that with the TC service team's support, caregivers are able to cope better and stress levels are reduced. The results are also helpful for healthcare providers in developing caregiver training programmes.

## CATEGORY: QUALITY IMPROVEMENT (NURSING)

AHF16QN010

## Implementation of World Health Organization High 5S performance of correct procedure at correct body site protocol for patient safety and quality care improvement

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**INTRODUCTION** In view of a steady increase in the number of reported cases of wrong surgery performed on wrong patients worldwide, our hospital implemented the World Health Organization High 5S correct site surgery protocol to prevent incorrect surgery. This implementation aims to standardise perioperative processes, establish effective communication among the surgical team and achieve safe surgery.

**METHODS** The High 5s standard operating procedure was incorporated into our existing surgical safety checklist. It consisted of 'preoperative verification', 'site marking', 'sign in', 'time out' and 'sign out'. The checklist was piloted in the last quarter of 2010. Three revisions were made based on team feedback. The final version was trialed on September 2011 and incorporated into our electronic medical record system on December 2011. Compliance was tracked via monthly audits.

**RESULTS** While using hardcopy checklists, compliance rates achieved a steady rate of 84.5% for completed accurate preoperative verification checks, 95.8% performed proper surgical site marking and 92.8% completed surgical time out. After electronic implementation, compliance rates for completed preoperative verification and surgical time out reached 100%, while proper site marking reached 99%. We managed to improve the system and completely eliminated manual data entry. Compliance rate was sustained for the past two years at 100%. No wrong site surgery cases were reported.

**CONCLUSION** Our implementation started with a visual checklist and was prototyped a few times to error-proof the process. Finally, the embedding of patient safety measures in the electronic medical records resulted in an effective 100% compliance of the complete patient safety process with sustainability, thus achieving our aims.

## CATEGORY: QUALITY IMPROVEMENT (NURSING)

AHF16QN011

## Nurse-led topical anaesthesia monitoring of perioperative patients in Day Surgery Centre

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**INTRODUCTION** Nurse-led perioperative care and monitoring (NLPOCM) was introduced for cataract surgery under topical anaesthesia (CSUTA). It reduces the manpower burden of having an anaesthetist and lowers healthcare cost.

**METHODS** A total of seven topical anaesthesia (TA) nurses were trained under a structured programme (completing 141 hours) accredited by the Anaesthesia, Ophthalmology and Nursing Departments. It comprised lectures, competency-based modules and on-the-job training. A care path with surgical inclusion and exclusion criteria for NLPOCM was developed. The TA nurse does preoperative assessment and intraoperative monitoring (covered by an anaesthetist), of vital signs and hand-holding reassurance. The patient's cost and time savings, quarterly patient satisfaction (measured on a 5-point Likert scale for speed of discharge, Day Surgery Centre experience, comfort during surgery, overall comfort,

effect of hand-holding and surgery bill size) and anaesthetic complication rate were measured over a one-year period.

**RESULTS** With an estimate of 400 subsidised CSUTAs per year, the total patient cost and time savings were SGD 48,708 and 66.7 hours, respectively. Mean patient satisfaction score was  $4.25 \pm 0.22$  (range 4.03–4.54). The hospital had a calculated manpower saving of SGD 334,329 per annum and NLPOCM freed up the anaesthetist to manage more complex medical cases. Staff feedback included increased confidence and perceived professional recognition for the nurses, and reassurance of the care model by the surgeons. Patients' feedback included relaxation with the hand-holding technique, faster admission and discharge processes, and lower bill size.

**CONCLUSION** NLPOCM of CSUTA is a safe and cost-effective care model that increases surgical volume, and is well accepted by staff and patients.

## CATEGORY: QUALITY IMPROVEMENT (NURSING)

AHF16QN012

## Efficacy of automated endoscope reprocessor water line disinfection

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**INTRODUCTION** The advent of innovation in endoscopy has resulted in an increased rate of endoscopic procedures, which necessitated the introduction of automated endoscope reprocessors (AERs) to provide a reliable disinfection process. However, there is relevant concern on whether the rinse water used during endoscope reprocessing is of high quality and bacteria-free. This study aimed to highlight the relevance of monitoring and provision of high-quality rinse water by AER water line disinfection.

**METHODS** Pre- and post-disinfection culture tests were carried out over a period of eight months. A comprehensive analysis created a relevant benchmark on water line disinfection work processes that comprised disinfection of AER water line monthly or after every bacteria-retentive filter change, AER preventive maintenance by the manufacturer's field service engineer twice a year, and filter change

every three months for pre-filtration filter and six months for bacteria-retentive filter.

**RESULTS** Test results obtained during the first two months of pre- and post-disinfection microbiology testing yielded positive results for *Achromobacter xylosoxidans*, *Comamonas testosteroni*, and the *Pseudomonas* species. After the water line disinfection, the microorganisms found in AER were fully eradicated. In subsequent months, water line microbiology test results rendered negative bacteria.

**CONCLUSION** Our study results verified that water line disinfection is an effective infection prevention measure that improves patient safety and quality of care. It prevents transmission of contagious diseases and reduces the risk of acquiring hospital-acquired infection. Guidelines have been reviewed and monthly water line disinfection has been implemented.

## CATEGORY: QUALITY IMPROVEMENT (NURSING)

AHF16QN013

## Home eye toilet to improve turnaround time of postoperative cataract patients

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**INTRODUCTION** Eye toilet is routinely performed by the Eye Clinic nurse on Postoperative Day 1 (POD1) after cataract surgery. It is crucial

to clean off eye discharge and debris to reduce the risk of infection, which can be vision-threatening. However, this procedure adds to

the clinic turnaround time (TAT) and total waiting time (TWT). There is approximately 100 eye toilets/month. Performing home eye toilet (HET) may reduce TAT and TWT.

**METHODS** Before discharging the postoperative cataract patients from the Day Surgery Operating Theatre (DSOT), the DSOT nurses educated them and their companions on proper eye toilet procedures using visual aids and instructional brochures. Patients visited the eye clinic the next day for their POD1 consultation. Baseline data on TAT and TWT were collected before implementation. Post-data collection using the same parameters and a simple survey on patient compliance were conducted.

**RESULTS** Data analysis using *t*-test showed that the average TAT was reduced by 14.4 min, from  $73.5 \pm 24.5$  min to  $59.1 \pm 17.7$  min ( $p < 0.05$ ). The average TWT was also shortened by 13.6 min, from  $58.8 \pm 23.0$  min to  $45.2 \pm 17.4$  min ( $p < 0.05$ ). There was no case of eye infection with the HET Care Path. Furthermore, this resulted in patient savings of SGD 8,928/year (i.e. SGD 7.44/patient), time savings of 281.5 hr/year (65 min/day) and manpower savings of SGD 14,096/year.

**CONCLUSION** HET is a safe and cost-effective modality of care. It shortens TAT and TWT, improves patient satisfaction and frees up nursing manpower for other deployment with no compromise in the quality of eye care.

#### CATEGORY: QUALITY IMPROVEMENT (NURSING)

AHF16QN014

## Standardisation of post-surgery advice slips in perioperative settings

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**INTRODUCTION** This collaborative improvement was carried out in the perioperative departments, including the Major Operating Theatre and Day Surgery Centre of Khoo Teck Puat Hospital. The focus was: (a) to standardise post-surgery education on advice slips across all disciplines; (b) to provide guidelines for carrying out post-surgery education to patients and relatives; and (c) to minimise information conflict among staff that are of different races and cultures. To date, there are nine types of advice slips made available.

**METHODS** Time spent during the discharge process was recorded for 20 cases. Costs between photocopier printing and vendor's printing were compared. The team consolidated information from the clinicians to produce a standard piece of information that would be disseminated to patients after surgery.

**RESULTS** A total of 3.3 hours were saved after the new standardised postoperative advice slip initiative was introduced. Variations in patient education were greatly reduced. The time saved benefited the team, as they could focus on the needs of other patients. Comparison of the cost of printing by vendors and printing via department photocopier machine showed that the new implementation was undisputedly more economic. This initiative improved operating theatre efficiency in terms of discharge process, reduced variations and standardised patient education information.

**CONCLUSION** Patients and caregivers are able to refer to advice slips for quick information without calling the enquiry hotline or check themselves into the Accident and Emergency Department. A yearly review of the care content will be carried out by different clinical departments.

#### CATEGORY: QUALITY IMPROVEMENT (PHYSICIAN)

AHF16QP008

## The eye-nose collaboration to optimise patient care in endoscopic dacryocystorhinostomy

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**INTRODUCTION** Nasolacrimal duct obstruction (NLDO) is a common problem in the elderly. It causes tearing, blurred vision and infection. Endoscopic dacryocystorhinostomy (EDCR) is preferred over open surgery to treat NLDO due to its faster recovery, surgical precision, better haemostasis and scar-free skin.

**METHODS** This was a collaborative project by the Ophthalmology and Ear Nose Throat (ENT) Departments to develop a hassle-free care path for managing EDCR patients. It comprises transdisciplinary care and coordination, and intraoperative surgical care to optimise treatment outcome. The surgical outcome, surgical complication rates and overall patients' satisfaction scores (on Likert Scale, 1–5) for five domains (combined care by both specialties, schedule pre- and postoperative clinic visits, care at Day Surgery Centre and surgical results) were measured.

**RESULTS** From Financial Year 2013 to date, 33 EDCR cases were done. Surgical success ( $n = 24$ ,  $\geq$  one-year follow-up) was 93.5% with symptomatic resolution (tearing and/or eye discharge), comparable to reported rates for EDCR (ranging from 70%–90%). Minor surgical complications included dry eye (1/24, likely pre-existing) and mild bruising (3/24). The mean quarterly patient satisfaction score was  $4.33 \pm 0.53$  (range 3.6–5.0). The transdisciplinary collaboration reduces need for septoplasty and upgrades the surgical technique to be more efficient and cost-effective, such as performing osteotomy with a chisel instead of a more expensive surgical drill.

**CONCLUSION** The EDCR Care Path optimises care, improves outcome and enhances medical advancement, and is well received by patients.

## CATEGORY: QUALITY IMPROVEMENT (PHYSICIAN)

AHF16QP009

## Flexible gastrointestinal endoscope reprocessing and hazards of biofilm formation: a multidisciplinary team approach involving microbiology, infection control and theatre

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**INTRODUCTION** Sporadic nosocomial infections linked with endoscopic procedures have been reported in the literature. Khoo Teck Puat Hospital Microbiology and Infection Control performs regular surveillance cultures of theatre gastrointestinal (GI) endoscopes to verify the efficacy of endoscope reprocessing. We present a summary of two cases where cultures were positive, highlighting the issue of biofilm formation in endoscopes and its prevention.

**METHODS** Surveillance samples from endoscopes were sent to the microbiology laboratory and processed using standardised culture techniques.

**RESULTS** Post-reprocessing cultures from two GI endoscopes turned positive. One instrument grew *Pseudomonas aeruginosa* and the

other, *Candida parapsilosis*. The reprocessing steps were thoroughly reviewed by the multidisciplinary team and instrument vendor. An examination of the dismantled instrument revealed a biofilm in the biopsy sampling end in both cases.

**CONCLUSION** Biofilms are difficult to eradicate through normal processing and can lead to persistent colonisation of devices. It is speculated that deterioration of the integrity of scopes with age may increase the likelihood of biofilm formation. The GI instruments were found to be nearing their end of life and in need of replacement. All recommendations arising from this interesting exercise were implemented with the help of the MOT team. We are closely monitoring the situation with the help of the microbiologists to prevent any recurrence.

## CATEGORY: QUALITY IMPROVEMENT (PHYSICIAN)

AHF16QP010

## Audit assessing utility of regional anaesthesia for cataract surgery in patients with dementia

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**INTRODUCTION** Dementia involves progressive cognitive decline with at least one impaired cognitive domain (language, judgement or visual perception) sufficient to interfere with social or occupational functioning. Cataract and dementia may coexist and at times it is difficult to distinguish if visual complaints are due to cataract or dementia. Cataract surgery may improve cognitive performance. Practices and preferences for anaesthesia vary and regional anaesthesia (RA) is considered unsuitable due to the patient's lack of understanding and cooperation. General anaesthesia (GA) is commonly used despite the known fear that it might worsen dementia.

**METHODS** All patients were re-assessed on the day of admission in Khoo Teck Puat Hospital (KTPH). RA was offered (irrespective of initial listing) depending on the patient's cooperation and level of under-

standing after informed consent of the carer or relative. If RA failed to provide adequate operating conditions, GA was employed on the operating table. We aimed to audit the local practices at KTPH.

**RESULTS** A total of 146 patients with dementia underwent cataract surgery over a three-year period. Patients were listed for GA (n = 70), RA (n = 65), topical anaesthesia (n = 1) and 'keep in view (KIV)' RA/GA (n = 10). A total of 33 patients received GA (25 from the GA list and eight from the KIV list), while 111 patients received RA (63 from the RA list, two from the KIV list, 45 from the GA list and one from the topical anaesthesia list), and two patients receiving RA had to be converted to GA on the operating table.

**CONCLUSION** RA may be considered as an option in most patients with dementia undergoing cataract surgery, subject to assessment.



# Acknowledgements

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LEE FOUNDATION

# PREVENTING VENOUS THROMBOEMBOLISM WITH MEDTRONIC

## THE FACTS

A blood clot that forms in the leg is called deep vein thrombosis (DVT). If the blood clot breaks loose and travels up to your lungs, it is called a pulmonary embolism (PE).

**Together, they are known as Venous Thromboembolism (VTE).**

## DID YOU KNOW?

- 1 IN 4** people die from causes related to blood clots
- 1 ~ 3** top cardiovascular killers are linked to blood clots
- #1** cause of preventable death in hospitals is VTE
- 60%** of all VTE cases occur during or following hospitalization



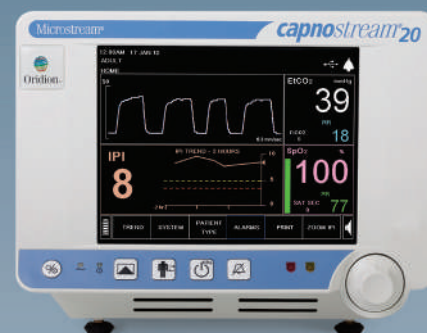
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**Nellcor™**  
Bedside SpO<sub>2</sub> Patient Monitoring System

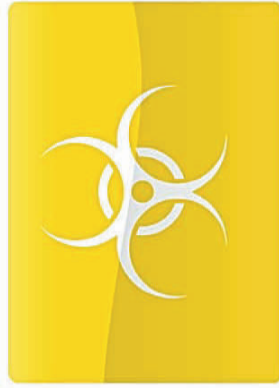
## THE ONLY INTEGRATED, COMPLETE PICTURE OF OXYGENATION AND VENTILATION



**Capnostream®**  
20p Bedside Capnography Monitor



We deliver healthcare solutions to improve quality of life



**Infection Control**



**Surgical Workplace**



**Critical Care**



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**Bed & Furniture**



**Biomedical  
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**Healthcare  
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## **idsMED Regional Presence**

► Hong Kong ► Indonesia ► Malaysia ► Philippines ► Singapore ► Taiwan ► Thailand ► Vietnam

[www.idsmed.com](http://www.idsmed.com)

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Email : [sgpidsmedicalsystems@idsmed.com](mailto:sgpidsmedicalsystems@idsmed.com)  
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At idsMED, we deliver quality healthcare solutions to improve quality of life

Our operations are in 8 countries; Hong Kong, Indonesia, Malaysia, Philippines, Singapore, Taiwan, Thailand and Vietnam.

It has a long-standing history and an extensive network covering over 2,000 healthcare institutions including restructured, government and private hospitals, day surgery centres, specialist clinics, polyclinics, defence health science, laboratories and nursing homes.

idsMED regionally represents world-leading medical brands & just to name a few; Ansell, Anios, Arjo Wiggins, Belimed, Hill-rom Hospital Beds, Hitachi-Aloka, Maquet Medical, Paramount Nursing Home Beds, Philips Healthcare, Smiths Medical, Teleflex/Hudson & the lists goes on in the region.

We provide quality one-stop integrated solutions including marketing, selling, biomedical engineering and clinical support.

Leveraging on its single, regional IT platform, idsMED also offer effective inventory management and logistics services, managing the sales to cash cycle and credit and collection process.

idsMED observes to the highest standard of service in the industry. Our distribution centre in Singapore complies with GDPMDS and our distribution service in Indonesia and the biomedical engineering team in Malaysia are both ISO9001 certified.

# Counting down to critical events: Catch them before it's too late



In one year, adverse events are estimated to cause up to  
**98,000** hospital patient deaths in the United States, alone\*

\* The Permanente Journal, 2007.

**Up to 17% of patients** in the medical surgical areas of the hospital will face an unexpected complication\*

\* Bellomo R, Goldsmith D, Russell S, Uchino S. Postoperative serious adverse events in a teaching hospital: a prospective study. Med J Aust. 2002; 176:216-218



Up to  
**8 hrs**  
prior

**70%** of cardiac arrest patients show signs of respiratory deterioration\*

\* Lippincott, Williams and Wilkins, 2012.

Up to  
**6 hrs**  
prior

**66%** of cardiac arrest patients show abnormal signs and symptoms\*

\* American Heart Association

Within  
**15 mins**  
of cardiac arrest

is when most Rapid Response Team patients are identified

— **most often too late to intervene\***

\* American College of Chest Physicians <http://journal.publications.chestnet.org/article.aspx?articleid=1186438>

How automated Early Warning Scoring (EWS) can aid in identifying patient deterioration when **there's still time to make a difference**



**Turn back the clock:**

EWS can aid in identifying subtle warning signs of physiological decline  
**6 to 8 hours before an event\***



**Enhance rapid response from the point of care**



**Have a positive impact on hospital length of stay**

\* Incidence, staff awareness and mortality of patients at risk on general wards. Fuhrmann L, Lippert A, Perner A, Østergaard D. Resuscitation. 2008 Jun;77(3):325-30. Epub 2008 Mar 14. PMID: 18342422 [PubMed - indexed for MEDLINE]

Visit Philips booth, and discover how **Philips IntelliVue Guardian Solution** can lead to **earlier detection of patient deterioration**

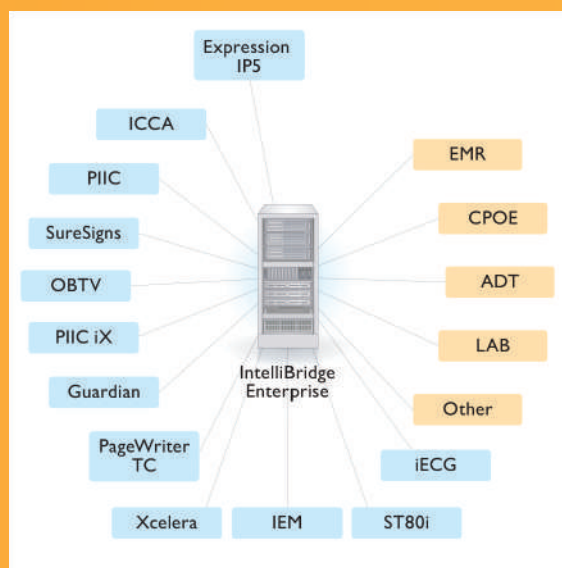
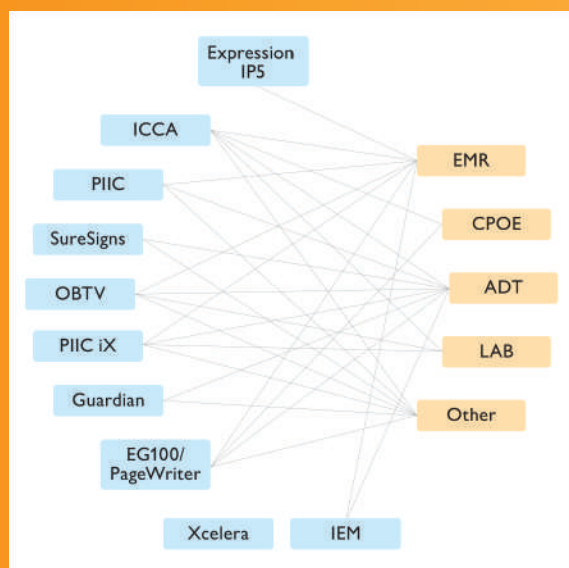
**PHILIPS**





# Managing the flow of clinical data

Due to rapid technological and legislative changes, the data collection associated with providing healthcare has increased dramatically. As the volume of patient data increases, so does the complexity of the interfaces among medical devices, hospital information systems, and the electronic health record (EHR). Philips IntelliBridge Enterprise (IBE) provides a single point of contact between the EHR and Philips clinical solutions. This reduces the number and cost of point-to-point interfaces, and offers workflow efficiencies to help you improve the quality of patient care.



innovation  you

# BIBI & BABA

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## ADVANCING THE ART OF ENDOSCOPY

As the world leader in endoscopy, OLYMPUS provides cutting edge medical technology to healthcare professionals around the globe.

Our latest introduction, EVIS EXERA III endoscopy system, is setting the new standards in visualization and control. These innovative technologies help to facilitate more accurate diagnosis and treatment, simplify setup and reprocessing with advanced levels of sophistication and integration.

**OLYMPUS**  
Your Vision, Our Future

Lack of manpower for expansion?

Demand rising due to growing aging population?



How to manage staff's increasing workload?

How to sustain productivity and resolve future challenges?

## WE CAN HELP.

### ENHANCED CERTIFIED PRODUCTIVITY PRACTITIONER (eCPP)

Learn · See · Apply

#### WHY eCPP?

- ◆ **Learn & Apply Productivity Knowledge**  
Apply tools & techniques to assess, identify and implement productivity roadmap while developing solutions for company's issues
- ◆ **Flexible Training Arrangements**  
Training of the whole project team made easy with both in-class and on-site training sessions
- ◆ **Continuous Improvement**  
Seasoned consultants to analyse the efficacy of solutions and plan further cycles for improvements

Achieve  
at least 20% of  
Productivity Improvement

Enjoy up to 90%  
WDA funding!

To know more about the eCPP programme,  
you may:

1. Register for next intake
2. Attend information session
3. Arrange for us to visit you

Call us today at 6375 0940

For full schedules or more information, please email:  
[ecpp@spa.org.sg](mailto:ecpp@spa.org.sg)

#### On-site Project Guidance

Participants undertake an in-company productivity improvement project for which project guidance will be provided. This ensures that companies benefit from sending staff for the course.

You will learn to:

- 1) Analyse productivity issues
- 2) Develop solutions
- 3) Implement improvements



#### SINGAPORE PRODUCTIVITY ASSOCIATION

The Singapore Productivity Association (SPA) was set up in 1973 as an affiliated body of the then National Productivity Board, now SPRING Singapore. Its objective is to promote the active involvement of organisations and individuals in the Productivity Movement and to expedite the spread of productivity and its techniques.

# P-MAX

## Maximise Your Potential

A **Place-and-Train Programme** for Professionals, Managers, Executives and Technicians

### P-MAX comprises Place-and-train (PnT) programmes that will:

- Assist SMEs to better recruit, train, manage and retain their newly-hired PMETs.
- Encourage the adoption of progressive human resource practices within SMEs.
- Help to place job-seeking PMETs into suitable SME jobs.

### P-MAX provides the following support:



#### **JOB MATCHING**

Job-seeking PMETs will be screened and matched into suitable positions in hiring SMEs



#### **TRAINING**

Up to 90% funding support for workshops conducted for SME Representatives and PMETs



#### **POST TRAINING FOLLOW UP**

Appointed P-MAX Programme Managers will follow-up with the newly-trained PMET personnel and their SME Representatives for a period of six months



#### **ASSISTANCE GRANT**

One-off grant of \$5,000\*

\*Terms and conditions apply.

Brought to you by



singapore  
workforce  
development  
agency

Programme Managers



**SNEF**



Singapore  
Manufacturing  
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新加坡製造商總會