ABSTRACTS

HEALTH SERVICES AND SYSTEMS RESEARCH

Best Oral Presentation

Day Two, 1340—1425, L1-S1

00009 A Cost-minimisation Analysis of Tissue-engineered Constructs for Corneal Endothelium Transplantation
Tan Tien-En1, Jodhbir S Mehta2, Eric A Finkelstein3, Gary S L Peh4, Benjamin L George4, Howard Y Cajulcom-Uy2, Dong Di2
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Aims: Corneal endothelium transplantation or endothelial keratoplasty (EK) has become the preferred choice of transplantation for patients with corneal blindness due to endothelial dysfunction. Currently, there is a worldwide shortage of transplantable tissue, and demand is expected to increase further with ageing populations. Tissue-engineered alternatives are being developed, and are likely to be available soon. However, the cost of these constructs may impair their widespread use. The aim of this study is to investigate the economic feasibility of using such tissue-engineered constructs for EK, over traditional eye-banking methods of donor tissue procurement.

Methodology: A cost-minimisation analysis comparing tissue-engineered constructs to donor tissue procured from eye banks for EK was performed. Both initial investment costs and recurring costs were considered in the analysis to arrive at a final tissue cost per transplant. The clinical outcomes of EK with tissue-engineered constructs and with donor tissue procured from eye banks were assumed to be equivalent. One-way and probabilistic sensitivity analyses were performed to simulate various possible scenarios, and to determine the robustness of the results.

Results: A tissue engineering strategy was cheaper in both investment cost and recurring cost. Tissue-engineered constructs for EK can be produced at a cost of US$880 per transplant. In contrast, utilising donor tissue procured from eye banks for EK requires US$3,710 per transplant. Sensitivity analyses performed further support the results of this cost-minimisation analysis across a wide range of possible scenarios.

Conclusion: The use of tissue-engineered constructs for EK could potentially increase the supply of transplantable tissue and bring the costs of corneal endothelium transplantation down, making this intervention accessible to a larger group of patients. Tissue-engineering strategies for other types of corneal transplants or other tissue types, such as pancreatic islet cells, should also be subject to similar pharmacoeconomic analyses.

00061 Effect of Time from Collapse to Return of Spontaneous Circulation on Survival and Functional Recovery in Out-of-Hospital Cardiac Arrest
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Aims: Return of spontaneous circulation (ROSC) defined as sustained palpable pulse or perfusing rhythm of more than 30 seconds, is thought to be an important predictor of survival in Out-of-hospital cardiac arrest (OHCA). However, the effect of the time interval to ROSC to the functional recovery of the OHCA survivors is not well studied. Furthermore, the duration that emergency medical services (EMS) should continue on-site resuscitation before futility sets in is yet to be established. The objective of this study is to explore the association of time from collapse to ROSC (tROSC) with both survival and functional recovery in OHCA.

Methodology: Prospectively collected OHCA cases with documented ROSC were retrieved from the Cardiac Arrest and Resuscitation Epidemiology (2001–2004) and Pan-Asian Resuscitation Outcomes Study (2010–2012) registries in Singapore. Arrests of non-cardiac etiologies and subjects with “Do Not Attempt Resuscitation” orders were excluded. Primary outcomes were 30-day survival and good
functional recovery with a Glasgow-Pittsburgh Overall Performance Categories of 1 or 2 as evaluated through telephone follow-up.

**Results:** A total of 855 cases were analysed with 16.6% (142/855) ROSC achieved on-site or en-route to hospital, and 83.4% (713/855) in the emergency department. 30-day survival was 12.5% (107/855) and 64.5% (69/107) of survivors reported good functional recovery. The tROSC was available in 57.4% (491/855) of these cases with a mean of 41.4 ± 19.0 minutes. Longest recorded tROSC for 30-day survival and good functional recovery were 80.0 and 67.0 minutes respectively. Mean tROSC was significantly shorter for cases with 30-day survival (24.0 versus 44.3, \( p < 0.001 \)) and for cases with good functional recovery (15.8 versus 35.2, \( p < 0.001 \)).

**Conclusion:** This study has shown that a shorter tROSC was not only associated with survival but also better functional recovery among OHCA survivors.

**00219 Cost-effectiveness Analysis on Gestational Diabetes Mellitus Screening Strategies**

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**Aims:** To conduct an incremental cost-effectiveness analysis of three gestational diabetes mellitus screening options: 1) universal screening, 2) risk-stratification screening, or 3) no screening.

**Methodology:** The primary outcome was lifetime incremental cost per quality-adjusted life year (QALY) gained. Probabilities, costs, and utilities were derived from the literature, Growing Up in Singapore Towards healthy Outcomes (GUSTO) birth cohort study conducted between June 2009 and September 2010, and KK Women’s and Children’s Hospital’s internal database. The decision tree model was developed in TreeAge Pro 2013. Base case, sensitivity analyses, and a Monte Carlo simulation were performed.

**Results:** Based on GUSTO data, the prevalence of Overt Diabetes Mellitus (ODM), Gestational Diabetes Mellitus (GDM), and mild GDM (mGDM) were 0.7%, 2.0%, and 6.6% respectively. Compared to universal screening, risk-stratification screening failed to identify approximately 40% of ODM, 25% of GDM, and 60% of mGDM. Risk-stratification screening compared with no screening had an ICER of $8,700 per QALY gained in our preliminary analyses. Relative to risk-stratification screening, universal screening had an ICER of $11,300 per QALY gained. Sensitivity analyses showed that the effectiveness of early glucose management had the biggest impact on ICER. If treatment of GDM reduced the complication likelihood by 13–15%, risk-stratification screening was favoured, whereas universal screening was favourable when complication rates were reduced by more than 15%. At a willingness to pay between $8,700 and $11,700, risk-stratification screening was selected in 50–65% of simulations. At a willingness to pay greater than $11,700, universal screening was selected in 50–100% of simulations. Lastly, at a willingness to pay of $65,000, which is in line with WHO guidelines for cost-effectiveness, universal screening would be selected in 100% of simulations.

**Conclusion:** Based on the model and best available data, universal screening is a cost-effective screening method compared to risk-stratification screening and no screening.

**00734 Role of HLA-B*5801 Genetic Testing and Safety Programme when Initiating Allopurinol Therapy for Chronic Gout Management: A Cost-effectiveness Perspective**

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**Aims:** We conducted a cost-effectiveness analysis of strategies, including HLA-B*5801 genotyping and safety programme, for risk mitigation of allopurinol-induced Stevens-Johnson Syndrome and Toxic Epidermal Necrolysis in chronic gout patients.

**Methodology:** A decision tree model was developed to estimate costs and quality-adjusted life years (QALYs) associated with 5 strategies over 20-year horizon, and identify conditions for cost-effectiveness. Strategies include 1) standard ULT with allopurinol as 1st line, 2) HLA-B*5801 genetic testing-guided ULT treatment, 3) standard ULT with safety programme for all patients, 4) Standard ULT with safety programme for HLA-B*5801 carriers, and 5) no ULT and treat acute flares only.
Results: No, ULT is never preferred given lowest QALYs and highest costs. Safety programme for all patients on ULT compared to ULT alone has incremental cost-effectiveness ratio (ICER) of SGD132,470/QALY and may become cost-effective with lower programme costs or higher effectiveness (< $60/patient, > 60% mortality reduction or > 24% reduction in incidence). Genetic testing-guided ULT treatment increases cost but reduces QALYs, as test-positive patients are restricted to fewer treatment choices, and potentially less effective gout management. Safety programme for all patients compared to targeted HLA-B*5801 positive patients achieve the same QALYs, but genotyping incurs higher cost. Safety programme for all patients compared to targeted HLA-B*5801 positive patients will be equivalent when costs of the genetic test falls below SGD60. Safety programme for HLA-B*5801 positive patients can be cost-effective for high risks patients, such as those with chronic renal impairment.

Conclusion: Genetic testing-guided ULT treatment is not preferred from cost-effectiveness perspective. Safety surveillance programme is not cost-effective under current assumptions, but may become cost-effective in cases of lower programme cost or higher programme effectiveness.

Best Poster

00039 Characteristics and Economic Impact of Frequent Attenders at the Emergency Department of a Tertiary Hospital
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Aims: Western studies have shown that frequent attenders (FA) present often for inappropriate reasons. Patient profiles at local EDs may be different. In view of an ageing population in Singapore, we aim to determine whether advanced age, presence of multiple comorbidities, and social issues contribute to frequent, inappropriate attendances at the ED, which therefore contribute to the financial burden on the healthcare system in comparison with non-frequent attenders (NFA).

Methodology: This study is a retrospective, case control study comparing a random sample of FA and NFA with details of their visits recorded over 12 months.

Results: In comparison with NFA, mean age of FA was 10 years older (54.6-years-old versus 45.15-years-old, \( p < 0.001 \)). They were also found to have more co-morbidities where 53.3% of FA have 3 or more chronic illnesses as compared to 14% of NFA (\( p < 0.001 \)), social issues such as bad debtor (6.3% versus 0%, \( p < 0.001 \)), smoker status (20.7% versus 4%, \( p < 0.001 \)), heavy drinker (3.3% versus 0%, \( p < 0.024 \)), and were often triaged to higher priority classes (52.2% versus 35%). The majority of their visits was appropriate (52.3%) and resulted in admission (83.0%). For the same number of patients, total visits made by FA ($174,251.28) cost 4 times as much as NFA ($40,912.83). This represents a significant economic burden on the healthcare system.

Conclusion: FA presenting at SGH ED are associated with higher age and presence of multiple co-morbidities and social issues, in contrast to a different profile of FA in the western world.

00048 Physicians’ Recommendations, Perceived Roles, Knowledge, and Attitudes Regarding Treatment of Patients with Advanced Serious Illnesses in Singapore
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Aims: Delivery of quality end-of-life (EOL) care is not just the responsibility of palliative care specialists, but is an important part of the role of all physicians who treat patients with advanced serious illnesses (ASI). The objective of this study was thus to assess the variation in practice styles of physicians who treat ASI patients, their perceived roles in providing EOL care, and their knowledge and attitudes regarding EOL treatments.

Methodology: We surveyed 285 physicians who treat ASI patients in Singapore. The survey questionnaire consisted of a series of nine vignettes describing patient characteristics and asking physicians whether or not they would recommend life extending treatments. Physicians were also presented with a best-worst scaling exercise in which they were asked to select their most and least
important role as a physician caring for an ASI patient. Finally, a series of questions were asked to assess their knowledge and attitudes towards certain EOL treatments such as pain management.

**Results:** Physician recommendations for treatments varied significantly by patient’s age, expected survival, treatment costs, and cognitive status. The most important perceived role regarding provision of EOL care was regarding symptom management. Only about one-fourth of the physicians answered all questions regarding EOL treatments correctly.

**Conclusion:** Results of the study indicate a considerable variation in physician recommendations regarding life extending treatments, their perceived roles in providing EOL care, and their knowledge and attitudes regarding EOL treatments, indicating a need for continuing education in palliative care for these physicians.

00265 Cardiovascular Health Screening Amongst the Urban Poor: A 1-year Prospective Intervention Study in a Low Socioeconomic Status Asian Population

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**Aims:** There is a lack of studies on access to preventive care in disadvantaged populations, particularly in urbanised Asian societies. We aimed to determine predictors for regular cardiovascular screening at baseline, 6 months after access-enhanced intervention, and 1 year later in low socioeconomic status (SES) communities in Singapore, a multi-ethnic Asian city-state.

**Methodology:** We conducted a prospective cohort study involving all residents aged ≥ 40 years in two rental flat precincts in Singapore, where nationally ≥ 85% of the population own homes. From 2009–2011, residents not regularly screened for hypertension/diabetes/dyslipidaemia were offered free BP/fasting blood glucose/lipid tests door-to-door monthly for 6 months and followed-up for 1 year. Multi-level multivariate logistic regression identified predictors of regular screening at baseline and Cox-regression identified predictors of screening post-intervention/after 1 year. A qualitative study was also carried out to determine residents' perceived barriers to screening.

**Results:** The follow-up rate was 80.9% (467/577) after 1 year. In 2007, nationally 63.9%, 72.2% and 78.0% had regular screening for hypertension, diabetes, and dyslipidaemia. In this low-SES population, at baseline, screening rates for hypertension, diabetes and dyslipidaemia were 43.1%, 38.8%, and 32.2%, respectively. However, after 1 year, screening rates rose to 67.6%, 70.1%, and 58.5%, respectively. Interestingly, screening participation came in two waves. The first group, tending to have higher individual socioeconomic status compared to their counterparts (p = 0.045), participated in the free, access-enhanced intervention in the first 6 months. The second larger group, which tended to have risk factors for cardiovascular disease (CVD) (p = 0.011) and more social support (0.046) chose not to participate in the initial intervention but subsequently participated in existing screening programmes within the year.

**Conclusion:** Access-enhanced cardiovascular screening can increase screening participation in low-SES communities. By bringing screening into residents' homes, such interventions can have an additional "knock-on" effect, by potentially catalysing awareness of CVD risk amongst patients and families.

00278 Patients’ Attitudes and Preferences Towards Decision-making for Intravenous Stroke Thrombolysis in Singapore

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**Aims:** Early initiation of stroke thrombolysis is associated with improved outcomes and lower bleeding risks. Procurement of consent is often a key factor prolonging the door-to-needle duration. We aimed to determine patients’ attitudes and preferences towards decision-making for stroke thrombolysis in Singapore.
ABSTRACTS

**Methodology:** We surveyed acute ischaemic stroke patients admitted to a large tertiary hospital in Singapore who presented beyond the 4.5-hour therapeutic window using a standardised questionnaire with hypothetical scenarios regarding consent for intravenous thrombolysis.

**Results:** Of the 112 patients surveyed, 57% were willing to receive thrombolysis if recommended by the doctor. In a scenario that the patient is mentally incapacitated, 82% were agreeable for their next-of-kin to decide on their behalf. If the next-of-kin was not present, 71% would be agreeable for the doctor to proceed with thrombolysis. When given a choice 61% preferred to follow their next-of-kin’s decision and 39% the doctor’s. In another scenario where the patient is mentally incapacitated and the doctor recommends thrombolysis but the next-of-kin does not agree, there was an equal split in preference to follow the doctor’s (50%) or next-of-kin’s (50%) decision. None of the responses were associated with age, gender, ethnicity, education level, marital status, or having adult children.

**Conclusion:** In Singapore, the attitudes and preferences towards decision-making for stroke thrombolysis vary and are not influenced by demographic and social factors. Nonetheless, doctors should practice within the Singapore Mental Capacity Act requirements that the doctor should be the decision-maker for emergency treatment such as stroke thrombolysis for a mentally incapacitated patient.

**00430 Incidence-based Projections of Functional Disability Amongst Older Adults: Does Accounting for Educational Attainment Make a Difference?**

*John Pastor Ansah, Chi-Tsun Chiu, Rahul Malhotra, David Bruce Matchar, Nicola Lew, Angelique Chan*

*Duke-NUS Graduate Medical School*

**Aims:** In planning for an ageing population, estimates of future needs based on functional disability are crucial. Education level has been associated with disability incidence. In Singapore, the proportion of elderly is expected to grow to over a quarter of Singapore’s population by 2030. This group is expected to be better educated. This study aims to project to 2040 and compare the number of Singaporean elderly with functional disabilities based on incidence with and without accounting for educational attainment, and to estimate the likelihood that not accounting for an “education effect” if true, would lead to a biased estimate of future prevalence of functional disability.

**Methodology:** Two dynamic multi-state population models – with and without accounting for educational differences – were developed. Transition probabilities between active and functionally disabled states and mortality rates were obtained from two waves of a nationally representative survey of community-dwelling Singaporeans aged ≥ 60 (n = 990) – the Social Isolation, Health and Lifestyles Survey and the Panel on Health and Aging of Singaporean Elderly. Demographic data was obtained from the Department of Statistics Singapore.

**Results:** Without accounting for educational differences, the number of elderly Singaporeans with functional disabilities is projected to increase more than 3 times from about 95,000 in 2010 to 308,136 in 2040. In comparison, accounting for educational differences projects there would be 235,518 elderly individuals with functional disabilities in 2040, or 24% fewer elderly individuals. There is a 95% likelihood that not accounting for educational difference will overestimate the number of elderly individuals with functional disabilities by at least 7.8% to as much as 35.8% in 2040.

**Conclusion:** Policymakers – especially those in countries like Singapore where the future elderly will be more highly educated, should consider the “education effect” in their planning of facilities and services to ensure that resources are optimally allocated.

**00468 Workforce Planning for Eye Services in Singapore**

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**Aims:** The study aims to project the workforce and training needs for ophthalmologists as well as the required numbers of nurses, optometrists, technicians, and patient service assistants to meet the increasing demand of an ageing and growing population in Singapore.

**Methodology:** Based on a model of the future demographic development, this project employs system dynamics to project future demand for eye care services. The model estimates the number of
healthcare professionals required to meet this demand. In addition, the model allows to determine the number of trainees which need to be trained every year. The work is based on data from local epidemiological studies, data on service utilisation collected by the Singapore National Eye Centre and extensive discussions with ophthalmologists and healthcare planners as well as expert estimates.

**Results:** Preliminary results show that the number of people with cataracts in Singapore will increase by more than 75% by 2030, while the number of those with glaucoma or age-related macular degeneration will increase by more than 70%. The number of people with diabetic retinopathy is also likely to increase by about 60%. In order to meet this increasing demand using the existing service model a doubling of the eye care workforce is likely to be required. To achieve the training programme for ophthalmologists needs to be expanded as a short- to medium-term measure. In the longer-term the number of training places can be reduced again.

**Conclusion:** In order to meet the needs of the changing population of Singapore, the provision of eye care services has to be expanded. This requires increased training efforts in the short- to medium-term. Alternative models of care delivery will modify these workforce requirements.

00631 Older Nurses in Singapore – Health Status and Challenges at Work
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**Aims:** Older nurses are experienced and productive healthcare providers. However, they are also vulnerable to musculo-skeletal disorders and stress-related mood disorders. There is little research addressing older nurses’ health status and challenges at work. This study aimed to describe the health status of older nurses and their perceived work challenges.

**Methodology:** A cross-sectional survey was conducted with aged 50 and above nurses who worked in three acute and 1 step-down healthcare institutions. The survey questions were formulated based on a comprehensive literature review and reviewed by human resource experts and senior nursing managers. All questions had fixed response alternatives, with average item CVI of 0.89. The questionnaire included items on demographics, general and specific health issues, work-related injuries and challenges, as well as views on re-employment and retirement.

**Results:** 462 nurses completed the survey (60% response rate). Majority were females (97%), Chinese (69%) and married (73%), with mean age of 57 (SD 4.8) years, and mean of 35 (SD 8.5) years working as an RN. Majority (84%) reported good or excellent health status. The most common ailments were high blood pressure (29%) and diabetes or other endocrine conditions (18%). The top 3 most common challenges at work were – working with computers (45%), coping with changes (36%), and reading labels (30%). 42% had suffered from work-related physical injuries at least once. Job grade (direct care versus managerial) was significantly associated with the general health status $x^2 (1, n = 400) =5.4, p = 0.02, \phi = 0.13$ but not other demographic variables. Significantly more direct care nurses reported ‘working with computers’ to be a challenge as compared to managerial level nurses $(x^2 (1, n = 400) =18.3, p = 0.0, \phi = -0.2)$.

**Conclusion:** Our results suggest that chronic illnesses such as high blood pressure and diabetes are prevalent among older nurses. Support and interventions addressing their health status and challenges at work are needed.

00662 Mid/late Life Risk Factors and End-Of-Life Inpatient Costs: Evidence from Singapore
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**Aims:** Identifying major drivers of end of life (EOL) healthcare costs is important for cost containment and cost planning efforts. There is little research on how EOL costs are influenced by risk factors present in mid/late life. This study fills this gap. We hypothesise that people who have adverse risk factors in mid/late life will incur greater EOL inpatient costs than those who do not.

**Methodology:** Data from the prospective Singapore Chinese Health Survey on risk factors are merged with data on inpatient costs from the Singapore General Hospital (SGH). The study sample consists of over 3,000 deceased Chinese Singaporeans who died at, or were admitted into SGH anytime between
2004 and 2011. Main risk factors are weight statuses, smoking statuses, and physical activity participation. EOL costs are measured by inpatient costs and inpatient days. Average EOL costs are estimated and stratified by number of months until death and by age of death. Generalised Linear Models (GLMs) are estimated for the relationship between these risk factors and EOL inpatient costs.

**Results:** Average inpatient costs incurred in the period of 6 months before death are estimated to be $15,240 per patient, which accounts for 80% of total inpatient costs incurred during the final year of life. Being overweight or obese at mid/late life is associated with an increase of $2,000 in inpatient costs during 6 months before death. People who participated in moderate physical activity at mid/late life incurred less inpatient costs (i.e. $2,300) in the final 6 months of life than those who did not.

**Conclusion:** Mid/late life risk factors influence EOL costs. Being overweight or obese and lack of moderate physical activity led to substantial increases in EOL costs. Policies that target these risk factors may help reduce inpatient costs incurred at end of life.

00674  Psychometric validation of the hyperglycaemia Fear Survey-II in Singapore

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**Aims:** To validate the Hypoglycaemia Fear Survey-II (HFS-II), originally developed and validated in the US, in Singapore.

**Methodology:** Patients with Type I or II diabetes on insulin treatment for at least one year at the time of the survey and on active follow-up in the Diabetes Centre at Singapore General Hospital were recruited (September–December, 2013). The instrument was culturally adapted with permission from its developer before its adoption in this study. The survey was self-administered in English or Chinese of patient’s choice. Traditional psychometric analysis was performed to assess the reliability and validity of the instrument using SPSS 17.0.

**Results:** Ninety-nine of the 150 recruited patients completed the full instrument and formed our final sample for this analysis (37% females, 63% Chinese, mean (SD) age: 46.65 (13.79) years). 50% of them had Type I diabetes with mean (SD) duration of diabetes and insulin treatment being 15.21 (8.90) and 9.59 (7.84) years respectively. 29% of the patients had > = 1 severe hypoglycaemic episode in the preceding 12 months, 50% had > = 1 moderate episode in the preceding six months, and 66% had > = 1 mild episode in the preceding one month. The Cronbach’s alpha for HFS-II was .932. Exploratory factor analysis suggested a five-factor solution explaining 56% of the total variance. The original worry subscale split into worry about physical/psychological damages and worry about damage to self-image; the original behaviour subscale split into self-sanction of daily activities, self-adjustment of treatment regimen, and dependence on others. The HFS-II scores were moderately correlated with depression ($r = .33$, $p = .001$), anxiety ($r = .38$, $p < .001$) scores, and with number of moderate ($r = .31$, $p = .002$), and mild hypoglycaemic episodes ($r = .24$, $p = .018$). Their correlation with the most recent HbA1c scores was weak and not statistically significant ($r = -.01$, $p = .91$).

**Conclusion:** Our data shows HFS-II is a reliable and valid instrument to measure fear of hypoglycaemia for diabetic patients on insulin treatment in Singapore.

00676  Subtypes of DMARD-taking Behaviours are Associated with Disease Activity Control in Singapore Rheumatoid Arthritis

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**Aims:** Medication with disease-modifying anti-rheumatic drugs (DMARDs) is the standard of care for rheumatoid arthritis (RA) but adherence to DMARDs is sub-optimal, ranging from 30–80%. This cross-sectional study sought evidence for subtypes of DMARD-taking behaviours and examined its association with clinical outcomes.

**Methodology:** English- or Chinese-speaking patients, 21 years and above, on Methotrexate, Hydroxychloroquine, Leflunomide, Sulfasalazine were consecutively enrolled from RA patients attending the SGH Rheumatology Clinic from November 2012 to March 2013. Medication adherence was assessed by the Morisky Medication Adherence Scale (MMAS-8) and disease activity control by the
Disease Activity Score-28 (DAS-28). Higher MMAS-8 scores represent better adherence. Lower DAS-28 scores represent better control. Subtypes of DMARD-taking behaviours were identified by performing a Latent Class Analysis (LCA) on the MMAS-8 and its association with DAS-28 examined in a linear regression that also included clinic attendance rates (0–100%) and age (years) as covariates.

Results: Data from 279 English-speaking patients were analysed: 82.5% were female, mean age was 57.4 ± 12.0 years. The ethnic composition was 76.0% Chinese, 11.7% Indian, 7.7% Malay, and 4.5% others. Two-thirds were on monotherapy, of whom 50.8% used Methotrexate. Three subtypes were identified: DMARD-adherent patients [adherent] (55.6%), unintentionally DMARD-non-adherent [UNA] (19.7%), and intentionally DMARD-non-adherent [INA] (24.7%). Patients classified as intentionally non-adherent were associated with poorer disease activity control: the expected DAS-28 scores of adherent and UNA types were lower by 0.52 (p < 0.001) and 0.56 (p = 0.014) points respectively compared with INA, controlling for clinic attendance rates and age.

Conclusion: Subtyping DMARD-taking behaviours in RA patients may aid in early prognostication and tailoring interventions to improve clinical outcomes via better adherence. Recognising intentionally non-adherent patients may identify those at risk of poor disease activity control and enable the provision of more intensive interventions than simple memory aids. Unintentional non-adherence can be screened and interventions to aid memory offered.

Abstracts

00005 Renal Recipient's Experience after Transplantation — A Qualitative Study
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Aims: This study aims to have an in-depth evaluation of the patients’ experiences after their transplantation. From their perspective, essential needs will be identified with the aim to help them to adapt and cope with their “new” life and transplanted kidney.

Methodology: This is a qualitative study, ten renal recipients were recruited. They were interviewed within a year post-transplantation on their experience of the care by the multidisciplinary transplant team in a local tertiary hospital. Data were analysed in the hermeneutic tradition using Knavles’ approach.

Results: The living donor recipients have more emotional preparation and education prior to the transplantation as compared to the deceased donor recipients. Most of the deceased donor recipients gathered their information from dialysis centres or internet. Knowledge on diet and medication compliance was identified as vital aspects prior and after transplantation. Only one participant verbalised the usefulness of current “Life” education booklet given to them after transplantation. Lifestyle changes, diet restriction, and health awareness were top three themes identified, which have affected the participants significantly. The fear of immobility post-operatively was expressed by two participants. There was no mention of coping issues in this group of participants. Financial support was another important aspect to reduce fear and stress to the participants. Misconception was present as participants felt that frequent visits to the doctors and the medicine incurred much higher cost as compare to dialysis treatment. The participants expressed that a seamless hospital system and continuity of care especially after office hours were essential. The hope for a renal support group was raised by some participants during the interview.

Conclusion: This study revealed an insight for renal recipients’ needs for individual application of the educational content and challenges faced by the renal transplant team. The patients’ perspective is important and useful guide to foster effective interventions in this field.
00035  Perception of Midwives on the Feasibility of Implementing the New Labour Pain Assessment Tool (CWLA)
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Aims: It is recognised that labour pain is different from all other pathological pain which indicate ill condition of one’s body. Numeric pain assessment tool currently used has been questioned for its inadequate assessment for labour pain. ‘CWLA’ was discovered as a new labour pain assessment tool which was believed to allow caregivers to evaluate labour pain more precisely and also allow labouring women to express their pain experience of labour simultaneously. This project aimed to assess the feasibility of the new assessment tool Coping With Labour Algorithm (CWLA), by exploring the views from midwives in local context and to make recommendations to the current practice.

Methodology: A qualitative method was used, in which two focus group interviews were conducted in two different settings in an obstetric unit in a tertiary hospital. A purposive of 10 registered nurses and midwives from the antenatal ward and labour ward, formed two focus groups. Structured interviews were conducted with the guide of pre-prepared questions. The interviews were tape-recorded and data was transcribed by the investigator. Thematic analysis was used to analyse data.

Results: Four major themes emerged from the data: 1) novelty of the CWLA, 2) suitability of the CWLA for managing labour pain, 3) barriers to the acceptance of CWLA, and finally 4) extra work load and more responsibilities.

Conclusion: Participants agree that the CWLA is preferred to the current numeric pain scale. However, its implementation calls for a reform of midwives’ and nurses’ management style from pain relief to supporting coping. Similarly, antenatal and labour wards may also need to acquire new resources or redesign the facilities to support labouring women using a variety of non-pharmacological coping methods.

00043  Do Digital Models Measure up to Plaster Study Models in Peer Assessment Rating (PAR) Index?
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Aims: To determine the validity and reliability of PAR Index score derived from digital study models versus plaster models of the same patient. This is to test the practical applicability of replacing plaster models with digital models in the assessment of occlusal relationships and evaluation of treatment outcome.

Methodology: 30 orthodontic plaster study models were scanned into digital study models using the 3Shape R700™ Orthodontic 3D scanner. To test for validity, PAR Index scoring was carried out on both the plaster and digital models by 1 independent examiner calibrated in the PAR Index. The PAR Index measurements of these 30 study models are repeated at a second sitting to test for intra-examiner reliability. Measurements were made on plaster models with the PAR Index ruler and on digital models with the 3Shape OrthoAnalyzer™ software.

Results: Bland-Altman plots were used to test the validity and intra-examiner reliability. For PAR Index score and 2 of its component scores: overjet and overbite, 28 out of 30 measurements were within 95% limits of agreement. The other 4 components that make up the PAR Index score had all points within 95% limits of agreement. For intra-examiner reliability, digital models had 28 out of 30 measurements and plaster models had 27 out of 30 measurements that were within 95% limits of agreement.

Conclusion: There was acceptable intra-examiner reliability in the measurement of PAR Index score for both plaster and digital models. Intra-examiner reliability appeared to be better with digital models. Digital models are a clinically acceptable alternative to plaster models in the measurement of the PAR Index. Improvement in software design and usage is necessary to attain greater agreement in the measurements of the overjet and overbite components of the PAR Index score between plaster and digital models.
00044 Can Digital Models Replace Plaster Study Models in Bolton Analysis?

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Aims: To test the reliability and validity of Bolton analysis done on digital models compared to plaster models, the current clinical standard for cast measurements.

Methodology: 30 sets of pre-treatment plaster models were digitised using a 3Shape R700 Scanner. The digital models were imported to the OrthoAnalyzer programme for analysis. Bolton analysis was carried out on the plaster and digital models by two examiners. Measurements were made with digital callipers to the nearest 0.01 mm for plaster models and with OrthoAnalyzer for digital models. One month later, the measurements were repeated by one examiner. Bland-Altman test was used to compare reliability and validity of measurements between plaster and digital models. Power of the study was 50%.

Results: The 95% limits of agreement for intra-examiner reliability of plaster models are -2.38 mm and +2.44 mm for overall discrepancy. The 95% limits of agreement for intra-examiner reliability of digital models are -2.30 mm and +2.17 mm for overall discrepancy. The 95% limits of agreement for inter-examiner reliability of plaster models are -2.57 mm and +2.25 mm for overall discrepancy. The 95% limits of agreement for inter-examiner reliability of digital models are -2.32 mm and +1.75 mm for overall discrepancy. The 95% limits of agreement between plaster and digital models are -2.26 mm and +1.72 mm for overall discrepancy.

Conclusion: The reliability of Bolton’s analysis on plaster and digital models is low, with 95% limits of agreement greater than the 2.00 mm level of clinical significance. Digital models show agreement with plaster models for Bolton’s analysis of tooth size discrepancy. The wide limit of agreement can be attributed to the limited reliability of Bolton analysis on both plaster and digital models. Bolton analysis done on digital models can be considered a valid alternative for Bolton analysis done on plaster models, but caution should be exercised in its application due to the limited reliability of the Bolton analysis.

00051 Living with a Temporary Urethral Catheter — Understanding Patient’s Perceptions and the Impact on their Activities of Daily Living

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Aims: This study aimed to evaluate patient’s perceptions of urethral catheter and to determine patient’s impact on activities of daily living during the temporary short term period when a urethral catheter is in place.

Methodology: This prospective descriptive study conducted in Singapore General Hospital Urology Centre outpatient setting involving participants who were on temporary short-term urethral catheter. Written consent was obtained with demographics collected. Participants needed to answer self-administered questionnaires (available in English and Chinese version) that comprised of participant’s understanding of urethral catheter and impacts of urethral catheter on their activities of daily living. Questionnaires were adapted by Khoubehi et al (2000).

Results: A total of 200 participants were recruited. Their mean age was 70 (range 27–103), comprising of 179 (89.5%) males and 21 (10.5%) females. The mean duration of catheter-days was 10 (range 2–27) days. 65% verbalised they were taught about care of urethral catheter but surprisingly 13.5% were unable to empty the urine bag. The major symptoms reported while having catheter were blood in the urine (37.5%), pain at genital area (32%), urine leakage (31.5%), and urgency to pass urine (28.5%). 50% of participants felt that it was very inconvenient having urethral catheter. 53% (out of 74 working participants) felt it prevented them from going to work, but other living activities were not impaired.

Conclusion: This study demonstrated that having a temporary short-term urethral catheter did cause inconvenience but did not affect much on daily living activities.
**ABSTRACTS**

00060  
**Duration of Resuscitation and Medical Futility in Out-of-Hospital Cardiac Arrest**  
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**Aims:** Out-of-hospital cardiac arrest (OHCA) has poor survival and resuscitative effort becomes futile rapidly. Several guidelines recommend termination of resuscitation (TOR) when return of spontaneous circulation (ROSC) is not achieved prior to transporting patient in unwitnessed arrests without shockable rhythms – ventricular tachycardia or ventricular fibrillation (VT/VF). However, the critical duration of resuscitation (DOR) before medical futility becomes imminent is not established. This study aims to identify the critical DOR before medical futility sets in.

**Methodology:** OHCA cases were retrieved from the Cardiac Arrest and Resuscitation Epidemiology (2001 – 2004) and Pan-Asian Resuscitation Outcomes Study (2010 – 2012) registries in Singapore. Arrests of non-cardiac aetiologies and subjects with “Do Not Attempt Resuscitation” orders were excluded. Primary outcome was 30-day survival. Multiple logistic regression models were derived and combined to predict the probability of survival given the DOR while controlling for the presence of witness and type of initial rhythms.

**Results:** A total of 3,833 cases were included. The 30-day survival was 2.8% (107/3,833) and ROSC was achieved in 22.1% (849/3,833) of the cases. Four different combinations were possible based on whether the OHCA was witnessed and whether shockable rhythms were present. A survival curve was constructed using the prediction of the model based on DOR for each of the four combinations. The critical DOR at which probability of survival is 1% is 17.6 (95% CI 3.0 – 30.9) minutes in unwitnessed OHCA cases without VT/VF; 28.7 (95% CI 18.9 – 38.9) minutes in witnessed OHCA cases without VT/VF; 62.9 (95% CI 50.5 – 83.5) minutes in unwitnessed OHCA cases with VT/VF, and 73.6 (95% CI 61.3 – 96.3) minutes in witnessed OHCA cases with VT/VF.

**Conclusion:** We demonstrated that different cut-offs for DOR may be applied under different scenarios depending on whether the OHCA is witnessed and whether the initial rhythm is favourable to defibrillation. Such a time dimension will be important in defining the clinical decision rules for TOR.

00070  
**Reducing the Outpatient Rescreen Rate in the Universal Newborn Hearing Programme: A Process Improvement Project in KK Women’s and Children’s Hospital**  
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KK Women’s and Children’s Hospital

**Aims:** Newborns who do not pass the inpatient automated auditory brainstem response (AABR) are rescreened at 3–6 weeks of life in the outpatient clinic. Our aim was to reduce the outpatient rescreen rate by 30%.

**Methodology:** Three parts of the current work flow were amended: 1) Screening all newborns in the nursery at 7 am in the morning instead of trying to locate those scheduled for discharge, who might be with their mothers in their rooms and would need to be transported to the nursery for screening. 2) Rescreening newborns immediately if they did not pass the first test, instead of waiting till the next day or giving an outpatient appointment, and 3) Amending the screening hours of one screener from 7 am to 3 pm to 9 am to 5 pm. The project was started in October 2013. Data was obtained from the hearing database and from manual records. Results were compared with screening data of October 2012.

**Results:** Eight hundred and sixty-three newborns were screened in October 2013. The outpatient rescreen rate was 0.6% compared to 5.6% in October 2012. The inpatient pass rate increased from 77% to 81.8%. None of the 157 infants who had a “refer” result at the first screen missed being rescreened before discharge, compared to 27.8% of 133 eligible infants in 2012. The ratio of newborns to number of inpatient screens was 1:1.4 in 2012 and 1:1.3 in 2013 (p > 0.05). 78 screens were performed after 3 pm (7.3% of total screens). There was no significant difference in the pass rates of infants who were screened within the first 6–12 hours of life compared to those screened at 12–24 hours of life (p > 0.05).
Conclusion: 3 simple steps successfully reduced the rescreen rate to 0.6%, with resultant saving of resources, time, and effort of parents and staff.

00071 Experiences of Young Women with Gynaecological Cancer
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Aims: This study aims to explore the experiences of young women with gynaecological cancers in Singapore.

Methodology: This is a qualitative research. To be eligible for the study, participants had to be female, between 18 and 30 years old, had already been diagnosed with gynaecological cancer for at least 6 months at the point of recruitment, and be able to speak English. A total of 7 participants were recruited from KK Women’s and Children’s Hospital through convenience sampling. A qualitative design was employed to undertake the study. An interview guide was used to conduct open-ended interviews with participants. Interviews were audio-recorded and transcribed verbatim and then analysed through the process of thematic coding.

Results: Two themes were identified: womanhood issues and coping strategies. For most of the participants, their main concerns were mainly fertility issues, body image inference, and loss of employment opportunity. It also highlighted that participants with good social support coupled with pro-active coping strategies coped better throughout the cancer journey. Lastly, most of them expressed keen interest in joining a support group because being with people of similar experience would help them cope better.

Conclusion: Therefore, when young women are faced with gynaecological cancer, their roles are disrupted, and their overall well-being is affected. Research has shown that when appropriate support and intervention is given to these cancer afflicted younger women, they will have better quality of life.

00073 The Physician’s Perspective on the Barriers to Referral and Uptake of Pulmonary Rehabilitation Programme in Singapore: A Preliminary Report
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Aims: Pulmonary rehabilitation programme (PRP) is one form of non-pharmacological management for individuals with chronic lung disease (CLD). Despite its strong level of evidence, the participation rate of PRP in Singapore is low. Hence, the aim of this study is to investigate the barriers to the referral and uptake of PRP from the physicians’ point of view.

Methodology: A survey was conducted using a questionnaire amongst 23 physicians who work with individuals with CLD from five restructured hospitals in Singapore. The questionnaire was used to understand the demographics of the respondents, the knowledge of PRP, and preferred choice of management of individuals with CLD.

Results: Three main themes associated with barriers to the referral to PRP were identified: lack of knowledge of benefits of PRP, low awareness of clinical practice guidelines, and lack of knowledge of referral system to PRP. Another three main themes associated with barriers to the uptake of PRP by individuals with CLD were identified: financial difficulties, transport difficulties, and individuals with CLD not keen to participate due to lack of social support and lack of motivation.

Conclusion: This study identified various barriers to the referral and uptake of PRP. It is integral to overcome these barriers to provide optimum management for individuals with CLD. Further research is warranted to explore the barriers to the uptake of PRP from the patients’ perspective. This will help to further understand and implement changes to help increase the utilisation of PRP in Singapore.
ABSTRACTS

**00078 Effect of Visual, Auditory, and Cognitive Impairments on Health Outcomes in Older Adults**

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**Aims:** Deficits in vision, hearing and cognition are common in old age and frequently co-occur. Pairwise combinations of cognitive and sensory deficits are known to significantly impact function. Here, we evaluated the impact of various combinations of all three deficits on patient-centred outcomes.

**Methodology:** We analysed baseline data from the North Carolina Established Populations for Epidemiologic Studies of the Elderly, a population-based survey of 4,126 community-dwelling adults aged 65 years and older in 5 counties in North Carolina. We included 3,871 participants with complete data on variables of interest. Cognition was assessed with the Short Portable Mental Status Questionnaire; hearing and vision were assessed by self-report. Logistic regression was used to assess the relationship between impairment categories and the following dependent variables: IADL disability, ADL disability, self-reported health (SRH), visit to healthcare person, number of ER visit, and number of times hospitalised overnight in past year.

**Results:** The overall prevalence of IADL impairment was 29.6%, ADL impairment 9.9%, and fair/poor SRH 46.6%. In bivariate analyses, compared to persons with no deficits, persons with comorbid hearing, vision, and cognitive deficits were at increased odds of IADL disability (OR 24.06, 95% CI 13.45–43.04), ADL disability (OR 9.60, 95% CI 6.05–15.23), and low SRH (OR 4.49, 95% CI 2.73–7.39). Regarding healthcare utilisation, subjects with hearing, vision, and cognitive deficits have an average of 70.56% increase in visits to health care person, 105.7% increase in number of ER visits, 15.71% increase in number of times hospitalised overnight in past year when compared to subjects with no deficits.

**Conclusion:** Cumulative deficits in cognitive and sensory processes are progressively associated with disability and low SRH. Understanding these interfaces is critical to healthcare delivery, intervention design, and policy-making for older adults.

**00081 A Study of a New Semi Cue-based Feeding Pathway for Healthy, Very Low Birth Weight Infants**

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KK Women’s and Children’s Hospital

**Aims:** Scheduled oral feeding starting after 34 weeks Post-Menstrual Age (PMA) for preterm infants at KK Women’s and Children’s Hospital (KKH) Special Care Nursery (SCN) delayed hospital discharge due to slow attainment of full oral feeding. A new semi cue-based feeding pathway involving healthy very low birth weight (VLBW) infants was introduced to facilitate earlier attainment of full oral feeding. The study aims to determine average time required for VLBW infants on the pathway to achieve full oral feeding, average PMA at full oral feeding, and hospital discharge.

**Methodology:** A total of 113 VLBW infants presented from January to September 2013. Eligible infants commenced oral feeding between 32 to 34 weeks PMA. Infants with Intraventricular haemorrhage (Grade III and IV), congenital malformations, gastrointestinal issues, chronic lung disease, or requiring respiratory support were excluded.

**Results:** 34 infants (30.1%) were included. Infants took an average of 12 and 16 days to achieve full oral feeding when bottled at 32 and 33 weeks PMA respectively. Average PMA at attainment of full oral feeding was 35 2/7 weeks while average PMA at discharge was 36 1/7 weeks.

**Conclusion:** This study advocates for early introduction of oral feeding for healthy preterm VLBW infants to achieve full oral feeding earlier, reducing delays in discharge. Further studies involving a control group is required to evaluate effectiveness of the new pathway. This new pathway may be beneficial to non-VLBW preterm infants born before 34 weeks PMA.
ABSTRACTS

00088 Taurolidine-citrate Lock Solution for the Prevention of Central-Line Associated Bloodstream Infection
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Aims: Central-line associated bloodstream infection (CLABSI) is a serious complication of patients on long-term parenteral nutrition (PN) as well as oncologic patients on chemotherapy. Taurolidine-citrate solution (TCS) is a catheter-lock solution with broad spectrum bactericidal and antifungal activity that prevents biofilm formation. The aim of this study was to evaluate the efficacy of TCS in reducing CLABSI in patients with intestinal failure on long term PN and oncologic patients on chemotherapy or bone marrow transplant.

Methodology: We retrospectively reviewed the clinical charts of 8 paediatric patients in whom TCS (Taurolock™) was started from December 2012 in KK Women’s and Children’s Hospital. Patients were recruited into the TCS programme if they were high risk from CLABSI: prolonged use of implanted central venous catheters including those on long-term PN, undergoing chemotherapy for malignancy or receiving stem cell transplantation (SCT), and had at least 1 previous documented CLABSI. The period of surveillance was from each patient’s first Hickman line or Port-a-cath insertion till current.

Results: There were 8 patients recruited with a mean age of 5.4 years, range 1.5–15 years. Half of the patients were on PN due to intestinal failure; 3 had malignancy: 2 neuroblastoma, 1 acute leukaemia, and 1 Wiskott-Aldrich syndrome on SCT. The mean number of CLABSI before TCS was 2.6, range 1–8. The types of organisms causing CLABSI were: Gram-positive cocci (45.8%), Gram-negative bacilli (45.8%), Bacillus species (4.2%), Candida albicans (4.2%). The CLABSI rates decreased from a peak of 15.2 (pre-TCS) to < 0.1 (post-TCS) per 1000 catheter days. Side-effects of TCS were minimal.

Conclusion: Taurolidine-citrate solution is an effective antimicrobial lock therapy to reduce the CLABSI rates in patients on long-term PN or receiving chemotherapy or stem cell transplantation.

00091 Mobility of a Guide Dog Team in Singapore: A Case Study
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Aims: There are only three people with visual impairment who handle guide dogs as mobility aids in Singapore. The study explored the mobility of a guide dog team (a person with visual impairment and a guide dog) and provided a deep understanding of this mobility as a complex, social phenomenon in the uniquely Singaporean context.

Methodology: The participants were a 33-year-old visually-impaired female and her 2-year-old guide dog. A qualitative, case study was conducted and data from semi-structured, in-depth interviews, observations, audio-visual materials, archived documents, journals, and personal artefacts were collected, transcribed, and analysed.

Results: Emergent themes of adaptation, knowledge, symbiosis, advocacy, and agency, with two overarching themes of functional-instrumental and symbolic-expressive were identified. Mobility with a guide dog was a life-changing experience, with both positive and negative impacts for the handler.

Conclusion: In the Singaporean context, the experience shifted the meaning of an inclusive society. For a contemporary society with limited space, inclusiveness encompasses hardware aspects and more pertinently, software aspects. The findings support the future development of conceptual and low vision rehabilitation service delivery models in the local context.

00098 Review of Best Practices for Next-generation Sengkang Health Pharmacy
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Aims: To review the current medication use and related supply chain processes locally and abroad, implementing existing good practices in a larger scale, innovating and exploring new ways to bring pharmacy practice to a new frontier at the upcoming Sengkang Health Hospitals.
Methodology: Through a series of site visits, focus group discussions, and reviews of evidences with end-users, medical planners, and consultants, a range of options were being explored. New proposed infrastructural options and workflows were then put to debates, simulations, and test calculations before fine-tuning into consensus acceptable to all stakeholders. The three categories of focus were medication safety by closed-loop medication management (CLMM) and knowledge-based medication administration (KBMA), outpatient medication reconciliation and automation, as well as community-centred infrastructure and services.

Results: For the aspect of medication safety, CLMM assisted by automated medication cabinets and unit-dose packaging may potentially not only reduce turnaround time for medications prepared by pharmacy and delivered to the various wards by Automated Guided Vehicles (AGVs), it means medications are ready for nurses to be served at the morning’s administration time. For outpatient medication reconciliation, by embedding the service within the clinic floors, it allows timely pharmacy intervention and easy collaboration with clinicians to optimise pharmaceutical care for our patients. In the effort to be more community-centred, steps are taken to cooperate with community partners to bring affordable and convenient services, such as home delivery of medication, multi-disciplinary home care, and online ordering with self-collection enabled for prescription refills, to our patients’ doorstep within the community.

Conclusion: The accepted proposals have been incorporated into the hospital designs. With strong support from SingHealth and continued innovations, we hope to see a more healthy and vibrant community in the North-eastern Singapore in the years to come.

00101 Determining the Bacterial Colonisation of the Anaesthesia Breathing Circuit: A Quality Control Initiative on Heat and Moisture Exchange Bacterial Filter (HME-BF)
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Aims: In the operating theatre, the anaesthesia breathing system is reused between patients. A new bacterial filter is used for each new patient. This is a pilot study to obtain baseline information about the extent of bacterial contamination of the breathing circuit. The use of bacterial filters (placed between the Y-piece of the breathing circuit and the endotracheal tube) has been recommended to protect the anaesthetic apparatus (including breathing circuit) from being contaminated.

Methodology: This is an evaluation study, there will be no change to the current practice in the operating theatre in regards to changing of breathing circuit (daily) and bacterial filter (every patient). Swabs for culture will be taken from the Y-piece of the breathing circuit at the beginning of the day, before commencement of first case, and as well as after the completion of each case. One last swab will also be taken at the distal end of the expiratory tubing after the circuit filter, and it is only taken after the last case on the list. The cost of single use breathing system is compared to the cost reusing the breathing system over 1 day.

Results: The result will decide whether we need to obtain a grant for a bigger scale study and if our current practice of reusing the breathing circuit for several patients can be disseminated to other healthcare institutions in Singapore in order to achieve considerable cost and environmental savings. Or prompt a review of the existing practice of reusing the anaesthesia breathing system.

Conclusion: Bacterial contamination maybe detected. However we do not know if this bacterial contamination will increase the risk of post-operative pneumonia. There is definitely cost savings from reusing the breathing apparatus but the presence of bacterial contamination should prompt further studies to find out if this is associated with increased risk of post-operative pneumonia.
00114 Improvement in Turnaround Time (TAT) Reporting of Bone Marrow (BM) Cytogenetic Analysis: The New Era of Laboratory Automation

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Aims: The TAT in reporting BM cases has been a major concern to the Cytogenetics Laboratory. Manual scanning of microscope slides for useable metaphases for analysis is tedious and results in a long time to complete a BM study. This is particularly acute with low mitotic index or poor morphology cases. The College of American Pathologists (CAP) has provided a 21-day maximum TAT guideline for BM cytogenetic reporting. A new automated system, MetaSystems Metafer Slide Scanning Platform, was acquired to improve in scanning and image acquisition. This study aims to determine the improvement in TAT reporting of BM analysis with the implementation of the Metafer.

Methodology: This study compared the differences in TAT between manual scanning and Metafer. Around 1000 cases each for manual scanning (7-month period Sep 2012 - Mar 2013) and Metafer (8-month period May - Dec 2013) were selected for the study. The average TAT was determined from each of the 1000 cases. The Metafer was programmed to scan the slides to capture 80 metaphases per slide for analysis. The scanning platform can run up to 160 consecutive slides per run.

Results: Before implementation of the Metafer, 46% of BM cases were resulted near the 21-day cut-off. Following implementation, 98% of cases were resulted within ≤ 14 days. The average TAT reporting of BM results with manual scanning and the Metafer were 13.1 days and 8.0 days, respectively ($p < 0.001$).

Conclusion: With the implementation of the Metafer, there was a significant improvement in the TAT in BM cytogenetic reporting time. The walk-away automation shortens the time taken for a BM analysis by automating the metaphase capture process, allowing the technologist to focus on the more important aspect of chromosome analysis. The resultant improvement in TAT reporting means better patient care as the haematologist can render appropriate care more expeditiously.

00118 Dementia Caregiver Burden among Asians: Influence of Disease Severity and Age of Onset

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Aims: To study the association between caregiver burden, age of onset, and disease severity among Asian patients with patients.

Methodology: A retrospective study of 180 caregivers of dementia from an Asian tertiary institution. The Zarit Burden Interview was administered by trained nurses to evaluate caregiver burden. A higher score indicates higher level of stress and burden. Additional data on demographic factors, socio-economic factors, employment status, age of onset of dementia, and severity of the disease were collected.

Results: The mean Zarit score for all 180 caregivers was 15.1. 71 caregivers had a Zarit score higher than the mean. Among caregivers with a high burden, 35.19% were caregivers of patients with Young Onset Dementia (YOD). The mean Zarit score of all patients with YOD as 14.1. Caregivers of older patients who were unemployed reported a higher burden score (98.51% versus 84.96, $p = 0.007$). The severity of disease also influenced the level of burden. Caregivers of patients who were in the moderate to severe stage of the disease reported significantly higher levels of stress compared to patients in the mild stage of the disease. A higher Zarit score was associated with worse performance on MMSE and (17.61 versus 20.59, $p = 0.002$), and MOCA (17.11 versus 19.47, $p = 0.022$) respectively. Age of onset did not influence caregiver’s burden.

Conclusion: Severity of dementia and age of dementia onset has a big impact on the caregiver burden. Early education for caregivers on dementia progression and expectations along with timely introduction of coping strategies will be useful in lowering caregiver burden.
00124 Transforming the 24/7 Clinical Biochemistry Laboratories: Design Considerations to Maintain its Vital Role in the Academia  
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Singapore General Hospital

**Aims:** In 2007, laboratory automation was installed in the 24/7 SGH Clinical Biochemistry Laboratories to achieve consistent turnaround times (TAT) for stat and routine specimens. With the confirmation of a new purpose-built Pathology building in 2009, herein lie a rare opportunity to design new facilities that will transform the delivery of clinical tests and embrace challenges.

**Methodology:** Pathology laboratories were to be housed in L8 to L13 of the new building. The Clinical Biochemistry Laboratories and the central specimen reception (CSR) were to be on L8. CSR and client services merged into the full-fledged Client and Specimen Management section within the department. Design of laboratory layout and workflow started with provisional space allocations and this process continued even as construction works approached L8. During the design journey, updates and decisions also incorporated directives from senior management.

**Results:** An early decision was that the 24/7 Clinical Biochemistry Laboratories be in close proximity to CSR. Two laboratory automation systems with high-speed online analysers were installed to support workload (5–7% annual increase) from SGH campus and outreach sites. Specialised biochemistry laboratories (performing tests using LC-MS/MS, HPLC, GC-MS, ICP-MS) were also located on the same level for efficient movement of specimens and staff. The pneumatic-tube-system was enhanced to connect the rest of the hospital to L8 and a vertical-transport-system was built to connect L8 to L9–L13 laboratories. Centralised laboratory-grade water supplies were established for uninterrupted support to the chemistry analysers. Installation and testing of the automation, analyser systems, and LIS network were accorded high priority to ensure operational readiness.

**Conclusion:** Post go-live on 22nd April 2013, TAT target for stat tests remains fully met. TAT for routine outpatient and inpatient requests were significantly improved. These performance results fully affirm the design and layout’s intended promise towards a highly efficient journey from specimen collection to result reporting.

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00126 ARK Diagnostics Methotrexate Determination on the Beckman Coulter AU680: Close Correlation with the Abbott TDx Assay  
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Singapore General Hospital

**Aims:** As a treatment option for various cancers, methotrexate (MTX), administered at high dose, with leucovorin rescue, entails close monitoring for effectiveness and clearance. Circulating blood levels can range from < 0.1 to 1000 µmol/L. With the approaching exit of MTX reagents on the Abbott TDx analyser (the test platform for many years), an alternative test kit, ARK-MTX from ARK Diagnostics, Inc., USA is evaluated for analytical performance.

**Methodology:** The ARK-MTX homogenous enzyme immunoassay was programmed via a UDR protocol on a Beckman Coulter AU680 chemistry analyser. Calibration was set up with 5-points (lowest 0.05 µmol/L), programmed in EIA-Type1/5AB mode. Test characteristics for limits of blank, detection and quantitation were studied. Imprecisions at 0.07, 0.39, and 0.90 µmol/L, linearity and method comparison were also evaluated. Clinical specimens tested on the current Abbott TDx analyser (TDx-MTX) were further measured with the ARK-MTX assay and evaluated for Passing-Bablok regression, Bland-Altman difference plot and Spearman correlation coefficient.

**Results:** Imprecision data showed within-run CVs 3–7.2% and total-run CVs 2.8–6.5%. Analytical measurement range (AMR) was demonstrated for 0.01–1.17 µmol/L with recoveries 90–109%. The laboratory-determined limits were: blank 0.005 µmol/L, detection 0.012 µmol/L, and quantitation 0.040 µmol/L. These observations validate the test specifications. Patient and control samples measured for both ARK-MTX and TDx-MTX showed close associations – Passing-Bablok regression y = 0.95x + 0.002, n = 50 (0.01–1060 µmol/L), Bland-Altman difference -15.7%, and a Spearman correlation (rs) 1.00. For values within its AMR 0.04–1.2 µmol/L (n = 30), a regression y = 1.00x - 0.005 was obtained; rs 0.99.
Conclusion: The ARK-MTX assay on the Beckman Coulter AU680 chemistry analyser produces values (0.01–1060 µmol/L) very close to those obtained on the Abbott TDx analyser. The ARK-MTX is a suitable replacement assay for methotrexate determinations.

00181 A Retrospective Study of the Medication Management Service (MMS) at the Singapore General Hospital (SGH)
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Singapore General Hospital

Aims: This retrospective study aims to study the drug-related problems (DRPs) encountered at the Medication Management Service (MMS), the types of interventions proposed to address the DRPs, the outcomes of the interventions, the estimated cost avoidance (ECA) as a result of the consultation, and patient satisfaction with the MMS.

Methodology: A total of 733 cases were reviewed by the MMS from August 2011 to August 2012. Relevant data regarding patients' demographics, number of medications prescribed, payment modes, information about DRPs, types and outcomes of interventions, and pharmacist-assigned ECA levels were retrieved. Patient satisfaction surveys were carried out via telephone calls to patients with =1 follow-up during the study period. Descriptive statistics were used to analyse demographic data. Multivariate linear regression was used to analyse significant variables identified in the univariate correlation analysis. Kappa statistic was performed to measure observer variability in the ECA levels. Logistic regression was used to identify predictors for ECA level = 4.

Results: In all, 2333 DRPs were detected and 726 interventions were proposed. Non-adherence was the most frequent DRPs (43.8%). 71.1% of the interventions were accepted by the doctors. Larger total number of medication was found to have a positive correlation with DRPs. ECA level 1 was the most commonly assigned level. Inter-rater reliability was found to be Kappa = 0.45 (p

Conclusion: Results from the study were encouraging with high intervention acceptance rate and patient satisfaction. It revealed the great impact MMS in SGH will have on the clinical and economic outcomes of pharmaceutical care in the future.

00200 Biopsychosocial Perspectives of Low Vision Patients — An Exploratory Study
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Aims: The management of low vision patients must be holistic with emphasis on both psycho-social and physical needs as responses to vision loss have a significant impact on this population’s quality of life. Studies examining the relationship between quality of life, functional performance, and visual skills training methods among low vision patients are limited. This paper discusses the role of coping mechanisms and motivation factors among low vision patients participating in a self-management programme.

Methodology: This interventional study developed, implemented, and evaluated a self-management programme for low vision patients to learn and develop the skills necessary to continue an independent life at the acceptance stage. This mixed method study is a two phase study. In phase 1, qualitative findings were collected through narrative from participating patients. Phase 2 included a randomised control trial of the programme with pre- and post-test data to demonstrate efficacy and impact on quality of life. Purposive sampling was used to select potential participants from the clinics. A total of 48 patients were recruited from the clinics and randomly allocated to the intervention or control group. Participants in the intervention group were required to attend a weekly intervention programme of four hours duration for a period of four weeks.

Results: Findings indicated that daily living activities for people with low vision are affected by biopsychosocial factors, and overcoming these factors would help these patients to lead an independent life.

Conclusion: This study shows that a self-care management for low vision patients could only be effective by having an in-depth understanding of the coping mechanisms and motivation in the
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rehabilitation of patients. A biopsychosocial assessment that assesses coping skills, acceptance of the disease, readiness for change, and social concerns is essential for effective self-management among people with low vision.

**00208 Factors Associated with Medication Non-Adherence among Community-dwelling Individuals in Singapore**

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**Aims:** Medication adherence is poor in chronic diseases and is a universal problem. Poor adherence to an effective drug, results in healthcare costs and poorer outcomes. Existing studies suggest risk factors for poor adherence include younger age, ethnicity, presence of co-morbidities, use of complex drug regimens, patients’ perception of side effects, cost concerns, doubts of the effectiveness of a drug, and dissatisfaction with their physicians. This study explored risk factors associated with medication non-adherence for community-dwelling individuals with one or more chronic conditions in Singapore.

**Methodology:** Data for this study came from a national health utilisation survey conducted in 2010. The survey investigated health service utilisation and characterized medication adherence and co-morbidities. We selected only patients with at least one of nine listed chronic conditions and defined medication adherence as not endorsing any of the four items in the Medication Non-adherence Scale. Bivariate analysis was performed between medication adherence and each of the hypothesised predictors: age, gender, ethnicity, co-morbidity, followed by multivariate logistic regression analysis.

**Results:** The final sample consisted of 431 individuals, with 56% females, 58% Chinese, 17% Malays, and 25% Indians. The mean (SD) age of the sample was 63 (12.1) years. Logistic regression showed that gender, ethnicity, and co-morbidity all had a statistically significant effect on medication adherence. Women compared to men (OR: 0.67, 95% CI: 0.46–1.00), Chinese compared to Malays (OR: 0.56, 95% CI: 0.33–0.96), and those with at least one co-morbidity compared to those without any (with one co-morbidity: OR: 0.33, 95% CI: 0.14–0.74; with two: OR: 0.35, 95% CI: 0.14–0.84; with three or more: OR: 0.39, 95% CI: 0.13–0.94) are less adherent to their medication.

**Conclusion:** This study suggests that being a female, an ethnic Chinese, or having at least two chronic conditions increases the likelihood of non-adherence to medication.

**00213 Paediatrics COBRA (Code Blue Review and Audit)**

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**Aims:** This is a retrospective review of paediatric code blue activation at KK Women’s and Children’s Hospital (KKH) from 2007 to 2012. During this period there were 215 code blue activations with between 31 to 48 code blue activations per year during this period or one code blue activation every 1 to 2 weeks.

**Methodology:** Relevant hardcopy resuscitation protocol forms from 2007 to 2012 were obtained and reviewed. Electronic medical records were also used to verify and fill in the data needed for incomplete forms.

**Results:** Eighty (37.2%) of the collapses occurred prior to arrival to the hospital. Of these, 47 (58.8%) were brought in by SCDF. 135 (62.8%) of the collapses occurred in the hospital. Of these, 27.4% collapsed in the ED, 35.6% in the HD/ICU, and 31.9% collapsed in hospital treatment facilities. This retrospective review reveals that of the children who collapsed in the wards, the majority (41.5%) were below one year of age. The immediate survival rate for all code blue events in the 6-year period was at 76.3%. The immediate survival rate for in-hospital code blue events was 89.6%. Adrenaline was administered in 94 out of 215 of the cases (43.7%). Of these, 80 cases had details on the administration of adrenaline. The average number of doses of adrenaline administered was 4, and 60% were given more than 3 doses. Those who were give less than 3 doses of adrenaline during resuscitation had an absolute survival rate of 90.6% with 9.38% succumbing during the code.

**Conclusion:** We specifically looked at the inpatient collapses and tried to identify potential markers for a subgroup of patients who might have a greater likelihood of collapse. We hope that these potential
clinical red flags identified could be used to develop a monitoring tool for use in the hospital as an individualised Paediatric Early Warning Score/System (PEWS).

**00223 Identification of Critical Drugs in the Hospital and Alternatives**  
Xiangrui Mai, Jamie Stephanie, Kae Shin Lim, Dorothy Li-En Koh  
KK Women’s and Children’s Hospital

**Aims:** The healthcare industry has been adversely affected by the growing problem of drug shortages due to stock disruptions. The drugs that are mostly affected include sterile injectable drugs, drugs needed for emergency medicines, cancer drugs, and electrolytes. Drug shortages may cause problems due to the unfamiliarity of prescribing alternative drugs or the lack of alternatives. This situation may even endanger patients’ lives if the drug affected is essential for survival. There is no data of the drug shortage situation in Singapore, but there were at least 20 cases of stock disruptions from 2012 to 2013 in KK Women’s and Children’s Hospital (KKH), all of which have resolved without serious impact. However, it is still important for appropriate strategies to be put in place. As the problem of drug shortages is more pertinent with drugs required for life-threatening conditions, drugs which are considered critical were identified from KKH’s drug formulary.

**Methodology:** This was done by excluding certain drugs from the drug formulary using a set of criteria and with advice from the hospital’s clinical pharmacists. A literature search was done to identify possible alternative drugs and management strategies were proposed if no alternatives were found. The recommendations were made with input from the hospital’s clinical pharmacists and key clinicians. General management strategies were adopted from guidelines developed by other health authorities e.g. Food and Drug Administration.

**Results:** A total of 99 critical drugs were identified from the formulary and 21 drugs were evaluated.

**Conclusion:** Future projects can be done to evaluate all the critical drugs and focus on the management of drugs more affected by stock disruptions. It is hoped that through this project, drugs identified as critical will be given more attention in terms of their usage and that the burden of drug shortages can be eased with the alternatives and strategies proposed.

**00228 Drug Information Needs and Concerns of Patients Prescribed with New Chronic Medication**  
Lawrence Sy Tar Liu, Bandy Qiuling Goh, Yu Jie Lee, Yufang Huang, Sarah Siew Cheng Tay, Christina Jit Fan Lim, Rachel Shu Yuen Khoo, Fei Ling Lo, Woh Peng Tang  
SingHealth Polyclinics

**Aims:** Studies showed that patients differ in the extent of drug information required, and inadequate provision of medical information predicts medication non-adherence. Since patients starting new chronic medication are less familiar with the medication, they may require more information support and have more medication-related concerns that may affect their medication adherence. This study aims to evaluate the drug information needs and concerns of local primary healthcare patients prescribed with new chronic medication, and their preferences in information delivery.

**Methodology:** A sample size of 120 patients with 80% power was targeted. 127 patients were recruited via consecutive sampling from pharmacies in four local public primary healthcare centres (called ‘polyclinics’). Since no existing questionnaire fully fulfilled the study needs, the investigators developed a questionnaire to interview each participant to evaluate drug information needs, preferences on information delivery, and concerns on new chronic medication. Results were statistically analysed using SPSS and Microsoft Excel.

**Results:** 95.2% of the patients agreed that information about the new medication should be given at the point of collection. Almost half preferred to receive the information verbally. 93.7% preferred to have the medication indication stated on the medication label. About two-thirds preferred to receive a patient information leaflet (PIL) in a language that they understand. Indication, side effects, dosing, and cost of the newly prescribed medication were the top four information important to patients. Side effects, long-term safety, and drug interactions were the top three patient concerns. 42.5% would not take their new medication if they have unaddressed concerns about the medication.
Conclusion: Medication counselling to patients prescribed with new chronic medication can be enhanced to include at least medication indication, dosing, side effects, and cost. Relevant PILs should be provided if available. Patient concerns on medication should be asked and addressed. These enhancements may improve medication adherence.

00240 New Direction in Dementia Rehabilitation Using 3D Technologies
Eveline Silva, Nagaendran Kandiah, Aloysius Yue Tat Ng, Sharon An Noi Koh
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Aims: Early intervention in dementia cannot be over-stated. Pharmacological interventions have been the mainstay, often overlooking non-pharmacological interventions. The comfort with which many embrace technology worldwide, presents opportunity for exploring it for therapeutic gain. In this study, applicability of a 3D virtual environment as possible non-pharmacological intervention in early dementia was evaluated.

Methodology: A novel 3D rehabilitation platform was developed to simulate daily activities; featuring 2 environments; supermarket and household kitchen. Participants interact with the virtual environments using 3D-glasses and modified controller. Scenarios are presented and participants navigate through the environment with guidance. Participants are introduced to the concept of 3D, trained on the equipment, and acquainted with the environment. Specific tasks administered, requiring attention, reasoning, and problem solving, tap on various cognitive domains. The 45-minute session is punctuated intermittently to monitor participant’s comfort level to 3D imagery. Participant’s feedback is collated assessing 1) efficacy of the technology for the intended group and 2) effectiveness of the session in cognitive stimulation.

Results: A pilot evaluation was conducted with 8 participants; 5 with mild dementia and 3 cognitively normal; aged 58–82 years (Mean age = 73.9 years), 75% Males. 87.5% of participants acknowledged the realism of the 3D and 75% felt at ease in navigating the environment after initial practice. 1 cognitively normal participant experienced discomfort which she attributed to history of vertigo. Remaining participants (87.5%) reported session interesting and 75% would return for future sessions. All acknowledged the intended benefit of the 3D rehabilitation programme in cognitive stimulation and would recommend it.

Conclusion: The 3D rehabilitation tool is an effective therapeutic intervention in early dementia has potential. The experiential learning on the programme simulates reality without the fear and embarrassment of cognitive lapses. Bridging the technology divide is the psycho-social support from the psychologist. Further evaluation of the programme is currently in progress.

00244 Reducing Unnecessary Antibiotic Use in Elective Caesarean Sections: A Resident-led Clinical Quality Improvement Project
Shu Qi Tan, Liane Suan-Li Koe, Jacqueline Jing Jin Jung, Michelle Hui Ping Lim, Tat Xin Ee, Kok Hian Tan
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Aims: Current guidelines advocate that single use of prophylactic antibiotics given at least 15 minutes before skin incision is as effective as a 5 day course of therapy after an uncomplicated caesarean section. Our traditional hospital practice used intravenous (IV) antibiotics pre-operatively followed by 24 hour IV course, and oralised for 1 week subsequently. The pre-operative antibiotics are not necessarily given at least 15 minutes before knife-to-skin. We conducted a resident-led clinical quality improvement project which aims to promote single use of IV antibiotics for elective subsidised uncomplicated caesarean section cases, to be given at least 15 minutes before knife-to-skin, so as to eliminate unnecessary and variation in antibiotic use.

Methodology: Five Plan-Do-Study-Act (PDSA) cycles were carried out over 4 months, mainly through education of our clinical staff of current evidence regarding timing and single antibiotic use for uncomplicated caesarean cases.

Results: A total of 102 cases were included in our study over the given time frame of 18 weeks. Compliance to single dosing of antibiotics increased from 0% to 100% by the 10th week, with no reported surgical site infections in uncomplicated elective subsidised caesarean sections despite the elimination of post-operative antibiotics.
Conclusion: There was a successful reduction in usage of unnecessary antibiotics. The benefits of extension of this move to non-subsidised and/or uncomplicated emergency caesarean section will be multi-fold.

00264 Development and Preliminary Validation of a Leadership Competency Instrument for High-potential Allied Health Professionals
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Aims: No instruments, to our knowledge, exist to assess leadership competency in allied health professionals (AHPs). This study aimed to develop the first leadership competency instrument for AHPs and examine 1) its factor structure, 2) its convergent validity with the Leadership Practices Inventory (LPI), and 3) its discriminative validity in AHPs with different grades.

Methodology: During the development phase, 25 items were included in the AHEAD (Aspiring leaders in Healthcare - Empowering individuals, Achieving excellence, Developing talents) instrument. A cross-sectional survey was then conducted in 106 emerging and existing AHP leaders from Singapore General Hospital (34 men and 72 women) of different professional grades (49 principal-grade AHPs, 41 senior-grade AHPs, and 16 junior-grade AHPs) who completed both AHEAD and LPI. Exploratory factor analysis was used to test the structure of AHEAD. Cronbach’s α was calculated to measure internal consistency. Spearman correlation analysis examined the convergent validity of AHEAD with LPI. Proportional odds regression was performed to compare the discriminative validity of AHEAD and LPI. From these ordinal models, the c-index “a measure of discrimination” was derived.

Results: As theorised, factor analysis suggested a two-factor solution, where “skills” and “values” formed separate factors. Internal consistency of the 2 factors was excellent (α-values > 0.88). Of 25 AHEAD items, 21 loaded on their designated factors. Total and component AHEAD and LPI scores correlated moderately (α-values, 0.37 to 0.58). The c-index for discriminating between AHP grades was higher for the AHEAD than for the LPI (0.76 versus 0.65; 95% CI for difference, 0.04 to 0.18).

Conclusion: The factorial structure of AHEAD was generally supported in this sample of AHPs. The AHEAD showed convergent validity with the LPI and outperformed the LPI in terms of discriminative validity. Although needing further validation, these results provide initial evidence for the use of the AHEAD instrument to assess leadership competency in AHPs.

00270 Quality of Anti-coagulation Therapy in Warfarin-naïve Patients — A Comparison between Pharmacist-assisted Anti-coagulation Clinic and Usual Medical Care in Singapore General Hospital
Shun Wei Lim, Cheryl Ying Lin Tan, Seng Han Lim, Ming Chai Kong, Heng Joo Ng, Lai Heng Lee
Singapore General Hospital

Aims: Pharmacist-managed anticoagulation clinics (ACC) have been shown to lower hospitalisation rates, increase time-in-therapeutic range (TTR), and improve cost-effectiveness as compared to usual medical care (UMC). However, the effect of ACC on the quality of anticoagulation therapy in warfarin-naïve patients in our institution is unknown. As such, the purpose of our study was two-fold: 1) To compare the TTR of newly initiated warfarin patients managed by ACC and UMC in Singapore General Hospital and 2) to evaluate differences in warfarin-related hospitalisations between both groups.

Methodology: This was a retrospective cohort study where 95 ACC and 239 UMC patients newly-initiated on warfarin between September 2011 and August 2012 were followed for one year after the first prescription of warfarin. Patient demographics, TTR, hospitalisation events, and costs were charted and analysed.

Results: ACC patients, as compared to UMC patients, had a significantly higher TTR (54.27% versus 34.10% respectively, \( p < 0.001 \)) and rate of thrombotic events \( (p = 0.020) \), and significantly lower minor bleeding events \( (p = 0.009) \). Time to bleeding \( (HR = 2.268, p = 0.509) \) or thrombotic \( (HR = 1.000, p = 1.000) \) event and hospitalisation cost \( ($5868.56 versus $8063.92, p = 0.624) \) were similar between both groups.
**Conclusion:** In conclusion, ACC management yielded higher TTR in patients newly initiated on warfarin. Although significantly lower minor bleeding events were found in the ACC group, results cannot be translated into definitive reductions in hospitalisation events and costs. Larger studies are required to examine the effect of ACC on the functional quality of warfarin therapy.

00291 **Reassessment: A Nursing Initiative at Children’s Emergency**
Germac Qiaoyue Shen
KK Women’s and Children’s Hospital

**Aims:** The main objective of this nursing-led project was to determine if the conduction of a nursing reassessment for P3 patients after registration prior to a doctor’s consultation will increase P3 patients’ satisfaction rating as translated by their caregivers. Three research aims were further crafted: 1. Maintain or increase nursing staff satisfaction rating pertinent to personal experience when managing P3 patients’ caregivers during long waiting time; 2. Enhance the delivery of safe patient care, as appropriate interventions can be performed if required e.g. uptriage or anti-pyretics administration; 3. Improve patients’ experiences in the department, resulting in long-term service quality benefits.

**Methodology:** A concurrent pre- and post-change patient satisfaction survey was issued to caregivers of P3 patients who had been reassessed by a nurse after registration prior to a doctor’s consultation. A pre- and post-change staff satisfaction survey was also conducted simultaneously.

**Results:** With the nursing reassessment activity, 84% of P3 patients’ caregivers rated their wait experience pertinent to after registration prior to a doctor’s consultation as satisfied; compared to the baseline rate of 41%. Adjacently, only 22% of nursing staff were satisfied about their personal encounters when managing P3 patients’ caregivers during long waiting time. After the nursing reassessment activity, there was a tri-fold increase to 69%.

**Conclusion:** The decrease in waiting time before being attended by a trained staff and the increase in number of contact points before consultation for P3 patients had evidently demonstrated an increase in P3 patients’ satisfaction rating pertinent to wait experience after registration prior to a doctor’s consultation. With the nursing reassessment activity, 88% and 90% of P3 patients’ caregivers indicated that they would return to Children’s Emergency in future for another acute complaint and will recommend the department to their friends/relatives respectively. Overall, 73% of nursing staff were also satisfied with the nursing reassessment activity.

00292 **Evaluating the Impact of Drug Dispensing Systems on the Safety and Efficacy in a Singapore Outpatient Pharmacy**
Yong Sheng Ong, Li Li Chen, Jane Al Wong, Yeyen Gunawan, Wei Jiang Goh, Mui Chai Tan, Soo Boon Lee
Singapore General Hospital

**Aims:** Automation of pharmacy workflow can reduce medication errors as well as improve efficacy of the medication picking, packing, and labelling process. Since June 2012, two drug dispensing systems (DDS) began operations in the Singapore General Hospital Specialist Outpatient Clinic Pharmacy. This study sought to evaluate the impact of the DDS on safety and efficacy in the pharmacy.

**Methodology:** The primary outcome of this study was the safety of the prescription filling process measured in terms of percentage prevented dispensing incidents contributed by DDS or manual picking of medications. The secondary outcome was the efficacy of the medication picking, packing, and labelling process measured in terms of picking efficiency of each full time equivalent (FTE) when assigned to either the DDS or manual picking stations. Data pertaining to the primary and secondary outcomes between January and December 2013 were collected and analysed.

**Results:** An average of 59,494 medications, were picked every month in the pharmacy. DDS accounted for 21.1 percent while manual picking accounted for 78.9 percent of all the medications picked. The median percentage prevented dispensing incidents per month committed by manual picking (0.27) was significantly higher ($p < 0.05$) than the DDS (0.00). DDS had greater picking efficiency with each FTE in the DDS having an average of 6,175 picks per month which was significantly higher ($p < 0.05$) than each FTE in the manual picking stations which had an average of 4,867 picks per month.
Conclusion: Installation of DDS in an outpatient pharmacy improved safety of the pharmacy workflow by automating the medication picking, packing and labelling process thus minimizing human errors. The efficacy of the medication picking, packing and labelling process was also improved by the DDS as there were continuous efforts to boost their productivity as well as bring more reliable and better able to handle fluctuations in patient load.

00294 KKH Health Screening 2013
Nicky Josman, Annie Goh, Shiling Tan, Seng Bin Ang
KK Women’s and Children’s Hospital

Aims: KK Women’s and Children’s Hospital (KKH) conducts staff health screening annually. Health screening consists of measurement of height, weight, blood pressure, fasting lipid panel, and glucose. Our aim in health screening is for early detection, prevention, and timely intervention of major diseases such as heart attack, diabetes, and hypertension. We analysed KKH staff’s health demographic based on health screening 2013 result to determine the health status of KKH staff.

Methodology: A total of 4,425 staff were invited to participate in the annual health screening via emails, roll calls, etc. The screening took place from 1 October to 31 October 2014. Fasting glucose and lipid, BMI, and blood pressure were obtained and an online questionnaire was used to evaluate the general health status of the staff including: medical history, physical activity, dietary practices, perceived level of stress, hobbies, etc.

Results: A total of 3,103 out of 4,425 staff (70%) participated in the health screening 2013. 13.9% of staff were at high risk for total cholesterol (Total cholesterol $\geq 6.2$ mmol/L) compared to 17.4% for Singapore population. 2.5% of staff had fasting glucose $\geq 7.0$ mmol/L and 5.25% had fasting glucose $\geq 6.1$ mmol/L. 16.4% of staff were at high risk Asian BMI (BMI $\geq 27.5$kg/m²) compared to 23% for Singapore population. For blood pressure, 8.65% of staff were in stage 1 or stage 2 of hypertension (Systolic $\geq 140$ mmHg or diastolic $\geq 90$mmHg) compared to 23.5% for Singapore population. 3.9% of staff identified themselves at extremely stressed category.

Conclusion: The health status of hospital staff appears to be better compared to the average population. Further studies to evaluate the difference between the health status of hospital staff and the general population would be useful.

00300 Invasive Aspergillosis Outbreak in a Bone Marrow Transplant Unit
Chia Yin Chong, Koh Cheng Thoon, Natalie Tan, Siok Hong Lim, Hernie Yunos, Chin Bee Tan, Wan Sin Lim, Nancy Tee, Matthias Maiwald
KK Women’s and Children’s Hospital

Aims: Due to renovation purposes, the original bone marrow transplant (BMT) unit was relocated from its original location on the 7th floor to another ward on the 4th floor at KKH. The aims of this study were to report the epidemiologic investigation in the outbreak of invasive aspergillosis (IA) in the new BMT unit between June and October 2012 and the interventions taken in aborting the outbreak.

Methodology: Epidemiologic investigations were conducted for the 6 patients with IA and implicated 4 rooms (nos. 7, 8, 9, 10) in the outbreak. Air sampling for mould and bacteria counts was conducted using a portable centrifugal air sampler in the implicated rooms at the head and foot ends of the patients’ beds when the rooms were empty and from the corridor outside the implicated rooms. Sampling for airborne mould was done using Sabouraud plates and for bacteria, using blood agar plates. The plates were incubated for 5 and 2 days, respectively.

Results: The baseline mould counts ranged from 2–838 CFU/m3. The bacteria counts ranged from 10–94 CFU/m3. Investigations revealed that HEPA filters were last changed in October 2009 and due for replacement in November 2012. The air changes had decreased to 6 per hour from the intended 12 per hour. Facility interventions included: 1. Replacement of the HEPA filters; 2. Sealing the exhaust vents and turning off the exhaust system, thus creating positive pressure within the rooms. Air sampling was repeated after the interventions and showed a decrease in mould and bacteria counts. No further IA cases were detected in BMT patients.
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Conclusion: BMT is a high-risk procedure and should ideally be performed in a positive-pressure HEPA-filtered room. Even though the HEPA filters were within the shelf-life, the no. of air changes should have been monitored regularly and earlier replacement of HEPA filters would have averted this outbreak.

00302  Pertussis in Singapore and Exposures at a Children’s Hospital
Chia Yin Chong, Natalie Tan, Koh Cheng Thoon, Hernie Yunos, Siok Hong Lim, Wan Sin Lim
KK Women’s and Children’s Hospital

Aims: This study reports the pertussis exposures from 2007–2012 at KKH and the infection control (IC) resources used. Due to the epidemic in 2007, the acellular pertussis (Tdap) booster vaccine was offered to healthcare workers (HCW) in contact with paediatric patients from 2008. In addition, we report the vaccine uptake and the annual Singapore pertussis notifications and primary school children Tdap vaccine update.

Methodology: This is a retrospective study of pertussis exposures, infection control costs, and appropriateness of IC precautions. Cases were defined as pertussis if they were positive by PCR or IF testing. The costs from each exposure was calculated based on: antibiotic costs, 2 hours of IC nurses’ contact tracing time, 1 hour of nurse manager’s time, and 15 minutes of review and antibiotic prescribing by the ID doctors. Annual Singapore pertussis notifications and school children vaccination rates were derived from the Communicable Disease surveillance 2012 yearbook.

Results: Overall 97 pertussis cases were admitted from 2007–2012 which peaked in 2007 at 35 cases. The total no. of HCW who were inadvertently exposed and needed prophylaxis was 118 (range 0–21 per case), decreasing over time. The percentage of exposures with appropriate precautions improved from 46% in 2007 to 80% in 2011. The annual costs for pertussis exposures also decreased over time. HCW Tdap vaccine uptake was highest when first launched in 2008 and in 2013 during catch-up vaccination. The annual Singapore pertussis notifications decreased from 2008–2010 but increased in 2011 and 2012. This coincided with school children Tdap coverage from 96% in 2008 to 94%, and 92.7% in 2011, and 2012 respectively.

Conclusion: Appropriate usage of droplet precautions and the inclusion of Tdap vaccine for HCW led to a decrease in the pertussis exposures. However as pertussis remains in the community, Tdap vaccination should be enforced for all HCW as well as school children.

00304  Unsuccessful Medifund Applicants: Mining the Data Through Quantitative and Qualitative Methodology
Chyi Yueh Tang, Pei Yi Tan, You An Ang, Yong Lai Meng Ow
Singapore General Hospital

Aims: Singapore’s healthcare financing system focuses on the twin philosophies of individual responsibility and affordable healthcare for all Singapore citizens. It was observed that about 1% of Medifund applications were unsuccessful. As a result, questions arising from this lack of information were often open to public speculation. This paper aimed to understand the profile of the applicants and the reasons for unsuccessful applications.

Methodology: Data on all unsuccessful applications (n = 286) were extracted from data repository of Singapore General Hospital Medical Social Services for the period between 2010 to 2012. The qualitative narratives on reasons for unsuccessful Medifund applications were mined. SPSS 17.0 was used to analyse the quantitative data.

Results: The mean age of the applicants was 54.6 years old (SD = 15.1). The majority of the applicants were female (50.7%), Chinese (70.6%), had secondary or below educational level (75.4%), were married (59.4%), lived in 3/4 room HDB flat (64.2%), and unemployed (62.2%). Among those who were employed, 72.5% were in the service and labour industries. The mean savings of applicant and/or spouse was $19,836.32 (SD = $560,534.80), whereas the mean assessed disposable monthly income of the applicants was $1,205.87 (SD = $1,467.91). The top 5 reasons for unsuccessful Medifund application were 1) presence of monetary resources, e.g. savings, income (32.9%); 2) presence of assessed disposable monthly income (29.2%); 3) budgeting issues (i.e. assessed household...
expenditure exceeds national average) (8.45%); 4) low cost of treatment (7.73%) and 5) did not utilise Medisave, MediShield, and/or private health insurance (6.75%).

**Conclusion:** While the demographics of the applicants may suggest that they had difficulty affording their treatment cost, they were assessed to have monetary resources (i.e. savings, income, disposable monthly income, Medisave, MediShield, private health insurance) to afford their health care expenses at the point of Medifund application.

**00305** Decreasing Potential Medication Error (PME) Rate in Bedok Polyclinic

**Sarah Siew Cheng Tay, Jamaliah Bte Jamil, Pauline Fei Ling Lo, Juliana Bte Bahadin**

SingHealth Polyclinics

**Aims:** The potential medication error (PME) rate is one of SingHealth Polyclinics’ important monthly tracked clinical indicators. Bedok Polyclinic has not been able to meet the institutional PME target rate since November 2012 and the rate has been rising since February 2013. This was made worse over the previous 6 months with the temporary closure of Tampines Polyclinic, where Bedok Polyclinic’s patient load increased as many Tampines patients sought doctor consultation there. This study aims to enhance the process by which doctors in Bedok Polyclinic prescribe medications in order to decrease the PME rate.

**Methodology:** An Enhancing Performance, Improving Care (EPIC) project was undertaken. A total of three process changes (PDSA cycles) were tested and implemented. The first (PDSA 1) involved training all doctors to ask their patients two standard questions to help ensure all medications were prescribed correctly, namely 1. Are there any changes in your medications since your last visit to the clinic? and 2. Are there any medications which you did not collect at your last visit that you need to collect today? The second process change (PDSA 2) involved providing all doctors with their individual 2-weekly feedback on the types and numbers of PMEs made. Reminders and encouragement was provided during the feedback. The last process change (PDSA 3) involved training the doctors to check all prescriptions for potential dosage/frequency/duration/drug errors before handing the prescriptions to their patients. A modified 2-weekly PME rate was used in the study. MS Excel QI Charts was used to analyse the PME data.

**Results:** There was a decrease in PME rate in Bedok Polyclinic.

**Conclusion:** The process changes tested were effective in decreasing the PME rate in Bedok Polyclinic.

**00327** Access to Primary Care for Mental Health in the Urban Poor: Uptake of Primary Care Referral for Cognitive Impairment and Depression in a Low Socioeconomic Status Asian Population

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**Aims:** There is a lack of studies on access to primary care for mental health issues in disadvantaged urban Asian populations. We sought to examine factors influencing participation in free, access-enhanced referral to primary care for depression and cognitive impairment amongst community-dwelling elderly in Singapore.

**Methodology:** This was a cross-sectional study involving all residents aged ≥ 60 years in two Singaporean public housing precincts, comprising owner-occupied and public-rental flats, in 2012. In Singapore ≥ 85% own homes; public-rental flats are reserved for the less well-to-do. Residents were screened door-to-door using the Mini-Mental-State-Examination (MMSE) for cognitive impairment (MMSE < 24) and the Geriatric-Depression-Scale (GDS) for depressive symptoms (GDS ≥ 5). Those with cognitive impairment were offered free referral to the polyclinic. Similarly, those with depressive symptoms were offered free referral to counselling services/polyclinics. Multivariate logistic-regression identified predictors of participation. Perceived barriers to service referral were examined via qualitative methods.

**Results:** With regards to cognitive impairment, 27.0% (33/122) accepted referral. There was no difference in acceptance between rental flat communities and owner-occupied flat communities (OR = 2.71, 95%CI = 0.75–9.87, p = 0.184). For depression, 41.3% (50/121) accepted referral. While higher
individual income was associated with increased acceptance amongst residents with depressive symptoms (aOR = 2.89, 95%CI = 1.01–8.32, p = 0.049), residents staying in rental flats were more likely to accept referral (aOR = 6.48, 95%CI = 3.93–19.60, p < 0.001). In our qualitative study, belief that cognitive impairment was an irreversible aspect of ageing was a common reason for rejecting referral. Stigma regarding depression emerged as a common theme for avoiding referral. Rental flat residents were more accustomed to receiving assistance, compared to richer counterparts who rejected assistance for fear of losing “face” in their better-off community.

**Conclusion:** Community outreach programmes to facilitate referrals to primary care for depression were better received in the lower-SES public rental flat community. Such programmes might potentially address inequities in accessibility to mental health services amongst the socioeconomically disadvantaged in Singapore.

**Evaluation of Troponin-T Collected in Rapid Clot Tubes: Relevance in the Emergency Room**

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**Aims:** Availability of troponin results quickly in the emergency room is important to the ER physician. While point-of-care tests on site have their advocates and opponents, there is still dependence on the central laboratory’s ability to deliver timely results for critical analytes such as troponin-T. Standard blood collection with clot activator/gel separator tube requires a recommended 30 min clotting time to yield a good serum specimen. We have previously evaluated a rapid clot tube (BD Rapid Serum Tube RST 368774) for 22 biochemical analytes including troponin-T at low concentrations. In this study, we evaluated the collection tubes for cardiac markers with particular attention to detectable and elevated troponin-T levels.

**Methodology:** Blood (triage warrants cardiac assessment) for cardiac markers troponin-T, creatine kinase (CK), creatine kinase-MB (CK-MB), NT-proBNP were collected in standard SST and RST collection tubes with informed consent given (IRB approval 2012/603/B). The specimens (n=52) were delivered via PTS to the central laboratories. Both tubes were placed on the laboratory automation system for serum separation by centrifugation and tested on an offline Roche cobas e602 analyser. Results were analysed by Passing-Bablok regression, Bland-Altman difference plot, and paired t-test.

**Results:** Patients averaged 63 yr (25–85 yr, n = 52, males = 41). Troponin-T levels for all subjects ranged from 0.01–3.58 ng/mL (31 cases ≥ 0.02 ng/mL); CK 30–2793 U/L (n = 20), CK-MB 0.43–141 μg/L (n = 19), and NT-proBNP 445–5119 (> 7000) pg/mL (n = 5). Paired results showed no significant difference on t-test analysis. Regression analyses demonstrated tight correlation between both RST and SST tubes. Troponin-T levels had a Passing-Bablok y = 1.00x + 0.00 (Spearman’s rs = 1.00), and Bland-Altman bias of -0.1% (95%CI = 12.4–12.1%). Similar associations were shown for CK and CK-MB.

**Conclusion:** Equivalent troponin-T levels to current SST tubes are shown with the RST tubes that will allow immediate testing on arrival at the central laboratories.

**Cross-cultural Adaptation of the Young Children’s Participation and Environment Measure (YC-PEM) in Singapore**

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**Aims:** Participation in childhood occupations is essential for children to grow and develop. Children participate in activities that are meaningful within their culture, and it is therefore important to measure participation within the context of their culture. Developed in North America, the Young Children’s Participation and Environment Measure (YC-PEM) is a parent-report questionnaire that assesses for participation and environmental support and barriers to participation for young children in their home, childcare/preschool, and community environments. This study aims to adapt the YC-PEM culturally in Singapore and to explore the types of participation and environment that are important to Singaporean parents.
**Methodology:** Interviews were conducted with 10 early childhood professionals to gather their perspectives of the relevance of the YC-PEM in Singapore and to provide suggestions for cultural adaptation. Cognitive interviews were also conducted with 10 parents of children with developmental delay to understand their interpretation of the items in the YC-PEM, to provide suggestions to improve on its relevance to Singaporean parents, and to understand the types of participation and environments that are important to them.

**Results:** The YC-PEM was culturally adapted in 3 areas: item, semantic, and operational. Professionals felt that it has the potential to inform decision-making amongst service providers and policy makers to provide an environment that promotes health and well-being for young children with developmental delay. Parents felt that it helps them to reflect on their children’s participation in different environments. Additionally, parents felt that basic care routines, socialisation and home environment are important to them.

**Conclusion:** This study will inform clinicians on the importance of culturally adapting participation and environment measures that were developed in other cultures due to the diversity in activity participation and environment between different cultures. It will provide insights on the types of participation and environment that Singaporean parents’ value.

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**00359 Five-year Survey on Satisfactory Level of Patients and Caregivers on the Asthma Right Sitting Programme**

*Teo Ai Huay*

 KK Women’s and Children’s Hospital

**Aims:** To evaluate patients’ or caregivers’ satisfaction level with the care after discharge to the community partners.

**Methodology:** Total of 567 of patients or caregivers were interviewed through phone as part of our services provided from March 2009 to July 2013. A telephone call to the family and patient were conducted by asthma community care nurse at 6 months after their discharge.

**Results:** In summary, 6 months after discharge, only 10% patients had unscheduled visits for asthma exacerbation. Asthma symptoms remained good, with more than 85% reporting no symptoms, and 96% with no limitation in physical exercise. 88% reported that the child did not missed any day in school because of asthma. The caregivers were generally happy with care in the community with 82% reported that they were satisfied with asthma control, and 93% parents did not have to miss work because of their child’s asthma problem. 75% of the children reported that they were happy with their asthma control. When evaluating the care in the community, 61 % of the parents indicated they are happy to be followed-up by the community doctor. 60% found it to be more convenient. 73% found that the GP’s clinic was nearer to their home and with more flexible hours for consultation. However, when it came to cost, only 19% of them found it to be cheaper to be followed-up by community doctor.

**Conclusion:** The results showed that it was amenable to right sit patients with stable chronic asthma on follow-up with Respiratory Medicine Service to the community partner with an effective transition plan. KKH asthma right sitting project is where the Asthma Community Nurses act as a liaison person with the Shared care community partner and Respiratory physicians, ensure the smooth transition of patient from hospital to community care.

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**00364 Paediatric Tube Direct Sampling by the Abbott Accelerator Automated Processing System**

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 KK Women’s and Children’s Hospital

**Aims:** Handling and processing paediatric blood samples from primary collection tubes has always been a challenge for laboratories receiving substantial amounts of paediatric samples. To prevent anaemia as a result of frequent draws in paediatric patients, automated analysers should be designed to handle small sample volumes collected in paediatric tubes. However, most automated analysers are only designed to handle standard adult tubes. Paediatric samples are often manually processed and the sera were aliquoted into sample cups. This process can lead to specimen errors and is time-
ABSTRACTS

consuming. In our study we assess the ability of the Abbott Accelerator Automated Processing System (APS) to handle and directly sample from primary paediatric blood collection tubes (Sarstedt Microvette with gel separator).

Methodology: We assessed the Abbott APS for direct paediatric tube sampling with the use of 13 X 75 mm polypropylene (PP) tube extender on the current Sarstedt Microvette tubes.

Results: The Sarstedt Microvette tube fits in with the 13 X 75 mm PP tubes. Thus the paediatric tubes can be directly loaded onto the Abbott APS. Problems pertaining to liquid sensing and sampling were not seen for samples with serum volume more than 400 ul. No probe crash errors attributable to incorrect centring were encountered, showing that sampling from the small-internal diameter is not a problem.

Conclusion: This study shows that the Abbott APS can handle and directly sample from primary paediatric tubes placed in tube extenders. This direct sampling method improves patient safety. It is less time-consuming and eliminates errors attributed to manual sample transfer and sample identification.

00395 Music Therapy at Singhealth: History and Development
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Aims: Since 2005, music therapy services have been accessible to patients at the Singapore General Hospital and KK Women’s and Children’s Hospital within SingHealth. Examples of populations served were premature infants, patients diagnosed with cancer, heart disease, neurologic disease, and children with hearing impairments, to name a few. This paper will provide an overview of music therapy services at SingHealth, including the top ten reasons for referral, a summary of current research supporting various interventions, and the logistics of sustaining music therapy services within the acute inpatient and outpatient setting.

Methodology: A historical analysis was conducted to understand the demographics and utilisation of services, and a timeline was mapped to track the initiation and development of research initiatives. The reasons for referral, outcomes including types of interventions offered, patients’ moods, along with how patients engaged were tracked.

Results: The main reasons for referral included pain, low mood, anxiety, neuro-rehabilitation, long hospital stay, complex social situation, developmental delay, failure to thrive, non-compliance to medical treatment, and family support. Three common misconceptions by patients and medical teams noted to often constitute barriers for music therapy referrals are: expectations for music prescriptions; misunderstanding the role of music therapy as entertainment or recreation and anyone can “do” music therapy. Three ongoing administrative challenges were: to develop a local research base; to weigh funding models to justify sustainability; to define the role of music therapy across patients receiving treatment in an acute tertiary hospital setting.

Conclusion: It is often challenging to translate scientific inquiry into human-based interactions, and to demonstrate quantifying objectivity in measuring mood and engagement responses. Yet, it is the subjectivity of these interactions within music that contribute to the holism and dignity of care. Over the last nine years, music therapy has contributed positive effects toward rehabilitation and medical outcomes, without negative side effects.

00408 A Nurse-managed Telephone Follow-up and Home Visit Programme for Patients with High Risk of Unscheduled Readmissions: A Randomised Controlled Trial
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Aims: To determine whether a nurse-managed telephone follow-up and home visit programme for patients with high risk of unscheduled readmissions can reduce hospital readmission rates and result in better patient outcomes.
**Methodology:** Patients randomised to the controlled group received routine care, which included instructions for medications, basic health advice, and arrangements for outpatient follow-up upon discharge. Patients in the intervention group received 4 follow-up telephone calls from the study team and 2 home visits by nurses within 30 days of discharge. Outcome measures included patients’ quality of life (QoL) as measured by SF-36v2 and unscheduled readmission rates at 30 days and 3 months after discharge.

**Results:** 101 patients participated, (47: control group and 54: treatment group). Chi-square test indicated no significant association between study groups and readmission within 30 days, \( x^2 (1, n = 99) = 0.001, p = 0.76, \phi = -0.031; \) nor readmission within 3 months, \( x^2 (1, n = 99) = 0.028, p = 0.67, \phi = -0.043. \) Except for role-physical, there was no significant difference in other QoL domains for the two groups at different time points. Surprisingly, role-physical score was significantly higher for the control group (mean = 65, SD = 26) as compared to the treatment group at 2 weeks after discharge (mean = 54, SD= 27; \( t(99) = 85, p = 0.05). \) For both groups, paired \( t \)-test demonstrated statistically significant improvements in all domains of QoL 2 weeks after discharge for both groups of patients. For the control group, paired \( t \)-test demonstrated a statistically significant increase in vitality score from 2 weeks after discharge (mean = 61, SD = 20.4) to 4 weeks after discharge (mean = 66, SD = 19.7), \( t(38) = 2.04, p = 0.048). \) For the treatment group, there was statistically significant increase in role-physical scores from 2 weeks after discharge (mean = 53, SD = 28) to 4 weeks after discharge (mean = 60, SD = 27), \( t(40) = 2.03, p = 0.049. \)

**Conclusion:** A nurse-managed telephone follow-up and home visit programme was safe but did not improve patients’ outcomes.

**00421 Singapore Neonatal Resuscitation Programme**

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**Aims:** The AAP Neonatal Resuscitation Programme was implemented in SGH since September 2008. This report describes the experience of participants and identifies areas for educational improvement.

**Methodology:** Training was conducted over 2 half-days in group size of 16 to 24 participants supported by 4 to 6 instructors. On day 1, participants attended two 1-hour lectures to reinforce core knowledge. Didactic lectures were interspersed with an hour of hands-on demonstrations to address the technical and complex behavioural skills required during neonatal resuscitation. On day 2, participants practice at standard scenarios in small groups. Knowledge was assessed through completion of 60 MCQs with pass marks set at 80% for doctors and 60% for other participants. Skill assessment was conducted using practical test involving the resuscitation of term and preterm newborns. Session was videotaped and used at debrief conducted in a large group at the end of workshop. Participants completed a survey which detailed the experiences of the learning encounter and feedbacks compiled and analysed to identify areas of strength and needs for improvement.

**Results:** From September 2008 to December 2012, 207 (90.8%) participants out of total of 228 attendees completed the survey. Eighty-nine percent rated training as good to excellent. Learning objectives were met in 87.4% of the respondents, of which 87.8% responded favourably to the clinical applicability of the learning programme. Practical test (86%) was rated as the most appropriate and effective way of learning followed by scenario teaching (83%) and lastly didactic lectures (67%). Time allocated for practical tests and scenarios were reported to be too short in 13 and 16% of respondents respectively.

**Conclusion:** The programme met the learning goal of majority of learners. Based on feedback, training was modified and didactic lessons replaced with online e-lessons. This resulted in 100% increase in time available for skill practice at face to face hands-on session.
ABSTRACTS

00423  Evaluation of the Outcome Transition of Stable Paediatric Asthma Patients to the Community
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Aims: The aim of the study is to find out the outcome of the patients right sited to their care, get feedback on their needs, areas of potential improvement for the programme, and find out more about some of their practices in managing asthma in children.

Methodology: A questionnaire survey was sent to the general practitioners and paediatricians with KKH Asthma Right Siting Programme. Total of 97 (18%) completed surveys received.

Results: Total of 51 (53%) patients went for the asthma review. 44 (45.4%) doctors found that right siting letter was useful for further management. 49 (51%) doctors were aware that the Asthma Control Test (ACT) was the tool for assessing asthma control for paediatric patients. 74 (76%) doctors provided an individualised asthma action plan. 70 (72%) of doctors would routinely ask about smoking/passive smoking for their paediatric asthma patients. 58 (59.8%) doctors used MOH’s clinical guideline, 19 (19.6%) used GINA, 11 (11.3%) used either MOH CPG or GINA in their management of Asthma.

Conclusion: Based on the survey, our team needs to improve on how to use abbreviation appropriately in the right siting letter. Glad that majority of the community doctors are using ACT and Written Asthma Plan as a tool to manage our stable asthmatic kids as the standard of care aligning with KKH Respiratory team.

00455  A Study of CYP21A2 Mutations Causing Congenital Adrenal Hyperplasia (CAH) in the Local Population
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KK Women’s and Children’s Hospital

Aims: To analyse the mutations in the CYP21A2 gene causing congenital adrenal hyperplasia (CAH) in the local population.

Methodology: Thirty-seven patients were recruited over a period of 5 years and with informed consent, EDTA blood was collected for DNA extraction. Mutational analysis of CYP21A2 was carried out by multiplex ligation-dependent probe amplification (MLPA) and direct sequencing.

Results: Twenty-one (56.8%) out of 37 patients have 2 mutations identified. These mutations are either a combination of a single copy deletion and a point mutation, or 2 point mutations. The types of point mutations identified are I172N, R356W, IVS2A/C>G, S268T, and W405X. Partial deletions of only one or two exons of the CYP21A2 gene and a single-base insertion at codon 482 in exon 10 were also detected. Two patients (5.4%) have gene conversion that leads to the replacement of the active gene by the pseudogene. Three patients (8.1%) have only one mutation detected with the other mutation unidentified. There are 11 patients (29.7%) with no deletion and point mutation detected.

Conclusion: This study allows us to understand the types of mutations present in the local population as the mutations causing CAH are heterogeneous. With the knowledge gathered from this study, we can better design detection strategies to identify the mutations in CAH diagnostics.

00462  A 2-year Experience in Prenatal Diagnosis of Common Chromosome Aneuploidies by Quantitative Fluorescence Polymerase Chain Reaction (QF-PCR)
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Aims: To review the accuracy and sensitivity of QF-PCR performed on amniotic fluid and chorionic villi from 254 diagnostic samples between year 2012 and 2013.

Methodology: DNA from patients’ samples was extracted by InstaGENE Matrix. Amplification of selected microsatellites on chromosomes X, Y, 13, 18, and 21 was carried out using Aneufast™
multiplex QF-PCR kit. Fragment analysis of amplicons was performed on ABI 3130 or ABI 3500DX genetic analyser and the ratios of the peak areas of individual markers were calculated.

**Results:** Chromosome aneuploidies were detected in 14 (5.5%) of the 254 diagnostic samples: seven trisomy 21, four trisomy 18, two monosomy X, and a suspected presence of 2 cell lines of XO and XY. The latter was confirmed by cytogenetic finding of mosaic consisting of 90% XO /10% XY. Four cases (1.6%) of anomalies detected by cytogenetic studies were not picked up by QF-PCR. This included a case of balanced Robertsonian translocation of chromosome 13 identified by karyotyping, QF-PCR detected single allele in all 7 chromosome 13 markers; a case of Robertsonian translocation involving chromosome 14 and 15, and two cases of mosaicism. One case of full trisomy 21 detected by karyotyping was not detected by QF-PCR due to presence of stutter peak and peak shoulder artefacts.

**Conclusion:** A total of 19 chromosome rearrangements (7.5%) were found in this series. QF-PCR picked up 5.5% common aneuploidy with 99.6% sensitivity and 100% specificity. As 1.6% anomalies involved structural rearrangements and mosaicism that can only be identified by cytogenetic analysis, full karyotyping should always be recommended to exclude abnormalities of other chromosomes and mosaisms. However, the short turn-around time (1–2 days) greatly reduces the anxiety of patients.

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00465 Profile of Paediatric Patients Diagnosed with Diabetes Mellitus in KKH during 2004–2013

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**Aims:** Almost all paediatric patients diagnosed with Diabetes Mellitus (DM) can be classified as having Type 1 (T1D) or Type 2 (T2D). In Singapore, T1D is relatively uncommon compared to many Western countries, e.g. Finland, Sweden, USA, and Australia. In contrast, childhood T2D is relatively common. It is becoming more challenging to distinguish between T1D and T2D in a newly diagnosed child with DM. Therefore, we compared the profile of paediatric patients diagnosed with T1D or T2D at our institution over a 10-year period.

**Methodology:** Patients recorded in KKH Diabetes Registry between 2004 and 2013 with a diagnosis of T1D or T2D presenting at age ≤ 16 years were analysed. We compared the gender, ethnicity, age at diagnosis, and presentation with Diabetic Ketoacidosis (DKA) or non-DKA between T1D and T2D.

**Results:** 507 patients were identified, of whom 58% had T1D. No obvious gender preponderance in T1D (male 48%) or T2D (male 47%) was observed (p = 0.93). Among T1D patients, 58% were Chinese, 13% Malays, 16% Indians, and 13% others, while 66% of T2D patients were Chinese, 24% Malays, 9% Indians, and 1% others (p < 0.001). Age at diagnosis of T1D (33% were ≤ 6 years (pre-schoolers), 51% 7–12 years (primary schoolers), 16% 13–16 years (adolescents) was significantly different from T2D (1%, 29%, 70%; p < 0.001). Many more T1D than T2D patients presented in DKA (51% versus 7%; p < 0.001).

**Conclusion:** Our data suggest that more than two-thirds of children with T2D were adolescents, with an over-representation of Malay ethnicity. T1D children were typically 12 years old or younger, half of whom were in DKA at diagnosis. Increased awareness is essential among parents, early childhood professionals, teachers, and healthcare professionals with a focus to recognise the early signs and symptoms of DM in young children. This may lead to reduction in DKA presentation at diagnosis.

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00486 Adherence to DMARDs in Singapore Patients with Rheumatoid Arthritis

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**Aims:** Poor compliance to initial DMARDs treatment may accelerate the progression of rheumatoid arthritis, and warrant more aggressive therapies, such as biologic agents, which may induce more medication-related complications and cost. The aims of this study were to estimate the compliance and persistence to methotrexate (MTX) in our local population, and evaluate if the compliance rate would affect the clinical outcome.

**Methodology:** The study was targeted at patients who were newly started on MTX in 2010 and they were being followed-up for the duration of two years. The prescribing and dispensing data were
extracted from CITRIX and MAXCARE respectively. Background demographics such as age, gender, racial groups were obtained and erythrocyte sedimentation rate (ESR) values were collected as a measure for clinical outcome.

**Results:** A total of 145 patients were analysed and the mean medication possession ratio (MPR) were not statistically different when compared between the demographics. Female patients had a higher MPR of 0.82 compared to their male counterparts of 0.77. MPR for patients in the age group ≥ 60 years old (MPR of 0.83) was higher than the younger patients (MPR of 0.8). Chinese population had the highest MPR of 0.84, followed by Malays with a MPR of 0.83, Indians with a MPR of 0.71,and the other racial groups combined had the lowest MPR of 0.58. Kaplan-Meier analysis showed that 83 (51.5%) patients were persistent with the MTX therapy after 2 years. The MPR and the percentage change in ESR values were analysed and a correlation coefficient of 0.04 indicated that there was a poor linear correlation.

**Conclusion:** Our local population was generally deemed to be compliant to MTX however this study was unable to identify any predictors of MPR based on the demographics assessed.

**00503 Review of Short and Intermediate Outcomes for Surfactant Administration in VLBWS in the SGH NICU**

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**Aims:** To review a revised surfactant protocol implemented since May 2013 in terms of administration and outcomes. Predictive factors associated with second surfactant dose and chronic lung disease (CLD) were also analysed.

**Methodology:** Retrospective cohort study of VLBW infants diagnosed with hyaline membrane disease (HMD) admitted to SGH from June–December 2012 (historical cohort) and June–December 2013 (intervention cohort) was reviewed. CLD was defined as oxygen requirement at 36 weeks.

**Results:** The diagnosis of HMD increased from 14/36 (38.9%) to 30/49 (61.2%). Surfactant administration rate, however, reduced from 10/14 (71.4%) to 19/30 (38.8%). Neither diagnosis nor administration rates were significantly changed. However, the median time of first dose of surfactant administration was reduced from 2 hours to 1.3 hours (p = 0.03). In the intervention cohort 84.2% of those who required surfactant received it within 2 hours, compared to 60.0% for the controls. However, only 47.4% in the intervention cohort received this within 1 hour. 77.8% infants who received surfactant < 1 hour required a second dose of surfactant. CLD incidence did not change 36.7%, compared to 35.7% historically. Requirement for second dose of surfactant, NEC, IVH, respiratory support duration, and admission duration were not significantly different between the 2 periods.

10/19 (52.6%) infants who received surfactant therapy < 2 hours developed CLD. Statistical significantly higher CLD was associated with surfactant < 2 hours at 17/19 (89.5%) compared to later, 13/25 (52.0%), possibly reflecting increased recognition of illness severity in those requiring early surfactant. Significant factors associated with CLD included birth weight, duration of intubation, duration of CPAP, duration of nasal oxygen, and admission duration. Compared to birth weight, duration of intubation had a stronger correlation with CLD.

**Conclusion:** Although time of first dose of surfactant was significantly earlier, there was no statistically significant improvement in secondary outcomes, including CLD.

**00522 Molecular Genotyping of Molar Pregnancy**

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**Aims:** Accurate diagnosis and classification of molar pregnancy is important for determining risk of subsequent gestational trophoblastic neoplasia and subsequent patient follow-up. Diagnosis is traditionally performed by histopathological examination of products of conception (POC), and is challenging in early molar pregnancies even with ancillary techniques like p57kip2 immunohistochemistry. Polymerase chain reaction (PCR)-based short tandem repeat (STR) DNA genotyping is a technique for genetic diagnosis of partial and complete moles. We aim to study the feasibility and value of this technique in our routine pathology service.
Methodology: DNA from both patients’ decidual and villous tissue were extracted and proceeded with a multiplex PCR using the PowerPlex®21 System (Promega Corp, USA) which is capable of detecting 20 STR loci and Amelogenin. PCR products were then analysed by capillary electrophoresis using AB3500 genetic analyser.

Results: Genotyping results showed concordance of histology and genotyping results in 44 out of 50 cases (88%). Two partial moles (cases 20 and 21) were histologically diagnosed as non-molar. Two non-molar pregnancies (cases 15 and 16) were histologically diagnosed as partial moles. One partial mole (case 14) was histologically diagnosed as an early complete mole. One case (case 13) had an unusual p57 staining pattern and a complex genetic profile suggesting androgenetic biparental mosaicism.

Conclusion: Molecular diagnosis of molar pregnancies by PCR-based STR DNA genotyping is valuable in the diagnosis of equivocal POC specimens in which distinction of an early molar pregnancy from a hydropic abortus is difficult on morphological grounds alone, and can identify and correctly classify occasional misdiagnosed cases. This is a technique which can be performed routinely in a diagnostic pathology department.

00552 Care Needs for Rheumatoid Arthritis from Patient Perspectives
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Aims: This study aims to identify the care needs for rheumatoid arthritis (RA) from patients’ perspectives.

Methodology: One-on-one in-depth interviews were conducted with selected patients with RA in March 2014 in Singapore General Hospital as part of a larger ongoing study. The interviews were performed by a trained sociologist following an interview guide allowing free probes. Each interview lasted for 20–60 minutes. 16 interviews were audio-recorded and transcribed with written consent from the patients. Notes were taken for the three unrecorded interviews. The transcripts and notes were analysed using NVivo 10 to identify major areas of patient-reported care needs.

Results: 19 patients (11 Chinese, 2 Malays, and 6 Indians; 17 females; age: 25–67 years; median educational level: higher secondary school) with 1–38 years of RA were interviewed. 15 had accepted that they would need lifelong RA medication; three were still testing if they could live without medication through self-experimentation; and one was in denial of the diagnosis. In additional to medical treatment, three other areas of care needs were identified: first, the need for knowledge about RA and its self-management (n = 17); second, the need for peer support to learn “how other people live with RA” (n = 11) and third, the need for psycho-emotional support to manage the emotional problems accompanying RA diagnosis (n = 9). These needs were most acute upon diagnosis and became less important once the patient had established new normality of life after having RA (e.g. avoiding things one cannot do due to RA without feeling bad, taking RA medication without feeling being hassled).

Conclusion: The results of this study suggest that RA patients’ care needs are multidimensional and time sensitive. A multi-pronged approach including drug therapy, and patient education, support, and counselling is needed from start of treatment to help patients form the new normality of their lives.

00555 Association of Self-reported and Clinically-assessed Disease Activity in a Cohort of Rheumatoid Arthritis Patients In Singapore
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Singapore General Hospital

Aims: The aim of this study is to assess the association of patient-reported rheumatoid arthritis (RA) disease activity using the RAPID3 instrument with clinically assessed disease activity measured by DAS28 scores.

Methodology: Data were derived from the baseline survey (June 2012 to December 2013) of a study to evaluate a new model of RA care – the Virtual Monitoring Clinic (VMC). RAPID3 scores (range: 0–30) and DAS28 scores (range: 0–10) were used to assess patient-reported and clinical outcomes respectively. Weighted RAPID3 scores (range: 0–10) were categorised into four levels: near remission.
(< = 1.00), low (1.01–2.00), moderate (2.01–4.00), and high severity (> = 4.00), as were the DAS28 scores: remission (< = 2.60), low (2.61–3.20), moderate (3.21–5.10), and high activity (> 5.10). Spearman correlation and weighted Kappa statistic comparing RAPID3 and DAS28 scores were calculated using SPSS 21.0.

Results: 251 eligible patients (83% female, 76% Chinese, 11% Malays, and 11% Indians, mean (SD) age: 59.11 (13.12) years) completed the survey. From remission to high severity/activity, the number of patients in corresponding RAPID3/DAS28 categories were 101/151, 66/51, 61/42, and 17/1 respectively. The rank order Spearman correlation between DAS28 and RAPID3 was .32 (p < .0001) and the weighted Kappa statistic using quadratic weighting was .32 (95% CI: 0.23–0.41). The highest and lowest agreements were found in the remission/near remission (73%) and high severity/activity (6%) categories; the agreements in the low (21%) and moderate (36%) categories fell in between.

Conclusion: Our study has found only an overall weak association between RAPID3 and DAS28 scores. However, the agreement between RAPID3 and DAS28 was high in the remission (DAS28)/near remission (RAPID3) category. This may suggest that RAPID3 is accurate when RA is well-controlled and not so when it is active.

00556 Assessment of Persistence to Methotrexate in Patients with Rheumatoid Arthritis at the Singapore General Hospital
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Aims: To characterise methotrexate (MTX) persistence in an Asian population and the reasons behind its discontinuation.

Methodology: In this IRB approved study, an inception cohort of rheumatoid arthritis (RA) patients newly started on MTX from 1st January, 2010 to 31st December 2010 were identified from computerised administrative databases at SGH. Survival analysis was performed to characterise persistence with MTX treatment over two years from inception. Cox proportional hazards modelling were performed to test the effect of demographic characteristics on MTX persistence. Reasons for discontinuing MTX were assessed through medical record review.

Results: Of the 160 RA patients in the inception cohort (81.8% female, 67.5% Chinese, 56.2 (13.5) age), 114 (71.2%) were persistent with MTX therapy during the 2-year period with 24 patients (15%) being censored for various reasons: seeking treatment for other conditions (n = 3), family planning (n = 5), no longer on follow-up at SGH (n = 16). 46 patients (28.8%) stopped MTX, with 25 (54.3%) because of non-adherence, 19 (41.3%) due to severe side effects, and 2 (4.4%) due to treatment inefficacy. Major side effects included gastro-intestinal toxicity (n = 9), hepatic transaminitis (n = 6), hair loss (n = 3), allergic reactions (n = 2), and miscellaneous reasons (dizziness (n = 1), anaemia (n = 1), tinnitus (n = 1), flu-like symptoms (n = 1), unspecified (n = 2)). Age, gender, and race had no effect on MTX persistence. Subjects who were persistent with MTX had significantly higher cumulative doses (1,258 mg versus 505 mg, p < 0.001) and a higher weekly dose (13.4 mg versus 11.4 mg, p = 0.02) than patients who ceased MTX. Among patients who stopped MTX during the study period, those who reported side effects were on higher dose of MTX than those who were non-adherent (13 mg versus 10.3 mg, p = 0.03).

Conclusion: The majority of RA patients were persistent with MTX within the first two years of MTX therapy. Non-compliance and severe side effects were the two main reasons for treatment discontinuation.
00557 Economic Benefits of a Virtual Monitoring Clinic for Patients with Stable Rheumatoid Arthritis and Spondlyoarthritis: A Preliminary Analysis
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Aims: The Virtual Monitoring Clinic (VMC) was implemented to reduce the need for hospital-based care for stable rheumatoid arthritis (RA) and spondyloarthritis (SpA) patients in the Singapore General Hospital (SGH). From the patient’s perspective, potential cost savings in VMC may be achieved through having blood test done at the polyclinic nearest home, telephone versus in-person consultation, and home delivery versus in-person collection of medications. This study aimed to 1) describe the baseline characteristics of VMC patients based on their health services utilisation (HSU) behaviour: a) blood test done outside of SGH (G1), 2) blood test done in SGH on the same day as consultation (G2), and 3) blood test done in SGH on any day prior to consultation (G3), and b) project potential cost savings of VMC, stratified by HSU behaviour and employment status.

Methodology: In this prospective single centre study, RA/SpA patients ≥ 21-years-old seen at SGH and assessed suitable for VMC by rheumatologists were recruited. Consenting patients provided information on demographics, HSU behaviour and indirect costs of care (i.e. transport costs and productivity losses for both patients and caregivers) through face-to-face interviews. Productivity losses were estimated using the human capital approach.

Results: Of 287 patients who consented, mean (SD) age was 57.2 (13.0) years, 233 (81.2%) were females and 199 (69.3%) were employed. There were 34 (12.1%), 43 (15.2%), and 205 (72.7%) patients in G1, G2, and G3, respectively. Five patients could not be classified in any of the 3 groups and were excluded. Baseline annual mean (SD) indirect cost of care ranged from $4.65 ($3.21) to $595.74 ($223.68) across G1, G2, and G3. Mean (SD) potential annual cost savings was $118.87 ($118.63) for all patients and $163.30 ($99.66) when only working individuals were analysed.

Conclusion: VMC has the potential to reduce patients’ and caregivers’ out-of-pocket expenses and productivity losses.

00580 Profile of Patients Seen at Fussy Eater Clinic
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Aims: The ICD-10 describes picky eating as a “feeding disorder of infancy and childhood”, encompassing – difficulty (in) feeding involving food refusal and extreme fussiness in the presence of an adequate food supply, a reasonably competent caregiver, and the absence of organic disease (World Health Organization, 2010). The combined Speech and Occupational Therapy clinic (SPOT) at KK Women’s and Children’s Hospital was set up to address the increasing trend of fussy eaters. Therapists assess and manage factors leading to a child’s feeding difficulties. This article seeks to profile the children seen.

Methodology: This was a retrospective observational study. We collated data from 103 children who underwent feeding therapy at SPOT over a four month period in 2013. Data was obtained from case notes and electronic medical records and analysed according to gender, age, medical diagnosis, and presenting problems at initial assessment.

Results: 71% of children were boys and 29% were girls. The largest age group was between 2 and 3 years old (21%) followed by 3–4 years (20%) and 1–2 years old (17%). 38% of children did not have formal medical diagnoses. However, a substantial number were on the autism spectrum (15%), born premature (15%), and diagnosed with developmental delay (18%). The most commonly observed problem was reduced parental management of child eating behaviours (65%). Other common problems include oro-motor (46%) and sensory (55%) difficulties. 65% of children had multiple presenting problems.

Conclusion: Data suggests that fussy eating has no definite relation to formal medical diagnoses. However particular conditions do show a higher propensity towards fussy eating. Information gained
from this study can improve awareness of fussy eating in the general population and identify children at higher risk. It can also be concluded that feeding issues are multi-factorial, and therefore require an interdisciplinary approach over an extended period.

**00581 Multidisciplinary Low Vision Rehabilitation in Singapore: A Case Report**

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**Aims:** Low vision causes multiple deficits to a person’s quality of life – functionally, psychosocially, emotionally, and economically. Studies have reported on the effectiveness of multidisciplinary low vision rehabilitation. The case demonstrates the management of low vision through a multidisciplinary, team-based approach in the uniquely Singapore context.

**Methodology:** The patient was a 70-year-old female with Retinitis Pigmentosa. Her visual acuity was 6/45 in her right and 6/60 in her left eye with advanced peripheral visual field loss. After an ophthalmic review, the ophthalmologist enrolled the patient into the Low Vision Enabling Programme at the National University Hospital. At the initial visit, the optometrist assessed her residual visual function and prescribed a hand magnifier to read newsprint. The occupational therapist assessed her functional level in daily living activities and subsequently provided a home visit. During the home visit, the therapist conducted scanning therapy and functional reading practice to obtain information from newspaper with the prescribed magnifier. The therapist also demonstrated the use of task lighting and placement to facilitate reading and encouraged participation at the Singapore Association of the Visually Handicapped to explore leisure activities.

**Results:** After experiencing low vision, the patient’s residual visual function and functional reading abilities improved through multidisciplinary low vision rehabilitation.

**Conclusion:** The case highlights a novel, multidisciplinary low vision rehabilitation model in Singapore. The findings support the implementation of managing low vision through an integrated, team-based approach in local hospital and clinical settings in future.

**00586 The Phenotypic Spectrum of Individuals with Sex Chromosomal Aneuploidies (SCA)**

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**Aims:** Sex chromosome aneuploidies (SCA) are a group of chromosomal disorders in which individuals are born with numeric abnormalities of the sex (X and Y) chromosome. This includes sex chromosome mosaicism, where one or more populations of cells have lost or gained a sex chromosome. They are the most common chromosome abnormality present at birth, with an estimated incidence of 1 in 400. Individuals with SCA often have mild developmental delays, learning disabilities, and behavioural problems. With the widespread use of amniocentesis and chorionic villus sampling (CVS), the incidence of SCA is now thought to be greater. We aim to provide information about the phenotypic range of individuals with SCA in the local population.

**Methodology:** We reviewed the records from cytogenetics laboratory at KK Women’s and Children’s Hospital (KKH) and identified all patients who had karyotype result of SCA and were on follow-up at the Genetics clinic at KKH. Patients with karyotype result of 47,XXX and 45,X (Turner syndrome) were excluded as they have been reviewed previously.

**Results:** A total of 40 patients were identified. Out of the 40, there were 17 patients with 47, XXY (Klinefelter syndrome) and additional 3 patients with mosaic 47,XXY/46,XY. There were 7 patients with 47,XY and additional 2 patients with mosaic 47,XY/46,XY. One patient has 48,XXXX and 3 patients have 49,XXXXXY. There are 3 patient with karyotype results of 45,X/46,XY, 2 with 46,X,idic(Y)(q11.2), 1 with mosaic 46,X,idic(Y)(q11.2)/45,X/46,X,del(Y)(q11.2), and 1 with 46,X,idic(Y)(p11.3)/45,X.

**Conclusion:** Recognition of the variability and imprecise prognosis of SCA provides valuable information for families, doctors, and health professionals in planning prospective medical care for couples with prenatal diagnosis of SCA and for individuals born with SCA.
00587 Telemedicine in Assessment and Management of Chemotherapy-induced Nausea and Vomiting
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Aims: Chemotherapy-induced nausea and vomiting (CINV) is one of the most distressing side-effect of chemotherapy. Poorly controlled CINV affects patients’ life quality, increases treatment complications and costs, and decreases treatment compliance. Telemedicine use has been limited in Asian cancer patients. Currently, data on the incidence and severity of CINV experienced at home by our cancer patients and formal guidelines for helping patients manage CINV at home is absent. This study aims to: 1) Assess the CINV incidence and severity experienced by KKH breast and gynaecologic cancer patients at home. 2) Explore the pharmacist’s telemedicine role in CINV management of home patients.

Methodology: This is a single-centre 9-month prospective observational study. CINV frequency and severity assessment was performed via patient diary and telemedicine calls on Day 1 and 5 post-chemotherapy. Patients completed satisfaction survey for telemedicine service at study end. Descriptive statistics, Pearson’s Chi-Square test, Fisher’s exact test, and qualitative analysis were applied.

Results: 174 chemotherapy episodes (58 patients) were included. Compared to moderately emetogenic chemotherapy, patients on highly emetogenic chemotherapy (HEC) experienced significantly more vomiting (16% versus 45%, \( p < 0.05 \)). An extremely high percentage of patients (97%) reported that the pharmacist’s telemedicine service enabled them to better manage CINV at home. 90% of patients reported that the telemedicine service enabled them to have easier access to pharmacists. A large percentage of patients (76%) solicited advice on other chemotherapy side-effects besides CINV.

Conclusion: Results highlighted that the current management of patients on HEC can be enhanced and that the current anti-emetics protocol should be reviewed. Pharmacists improved patients’ healthcare experience via this telemedicine service. This service can be expanded to provide a more comprehensive chemotherapy side-effects management service rather than CINV itself as majority of patients solicited advice on other chemotherapy side effects besides CINV.

00594 A Comparative Study of HER2 Gene Amplification Analysis by HER2 Dual-Colour ISH Assay (DISH) and Fluorescence in situ Hybridisation (FISH)
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Aims: HER2 (Human Epithelial Receptor 2) expression level is associated with clinical outcomes in patients with breast cancer and determines the eligibility for Trastuzumab treatment. Immunohistochemistry (IHC) is routinely done to assess HER2 protein expression. An equivocal result (2+) will require fluorescence in situ hybridisation (FISH) test to elucidate its true genomic status. HER2 Dual-colour chromogenic in situ hybridisation (CISH) is gaining recognition as an alternative because it allows evaluation of slides using a bright-field microscope. The authors studied the reliability of CISH in the evaluation of HER2 genomic status and ascertain the concordance between CISH versus IHC and FISH data.

Methodology: A total of 111 breast cancer cases comprising 20 IHC negative (0 to 1+ staining), 20 IHC positive (3+ staining), and 71 IHC equivocal cases (1+ to 2+ staining) were evaluated with VENTANA INFORM HER2 Dual-ISH. Equivocal cases were sent to an external cytogenetic laboratory for FISH analysis. In both assays, the scoring algorithm employed adhered to ASCO/CAP guidelines.

Results: In the IHC negative (0, 1+) and positive (3+) cases (n=40), there was 100% concordance for HER2 amplification by CISH. Among the 71 equivocal cases, HER2 amplification was detected in 22 cases by FISH and in 24 of 71 by CISH. Results of each method agreed in 99/103 (96%) cases.

Conclusion: There is excellent concordance between IHC, CISH and FISH data. This study demonstrated that CISH assay is a feasible test and can be easily established in a histopathology laboratory with the necessary equipment already exist. Automated staining protocols allows for
uniformity and less technical variability. Good morphology allows for simultaneous interpretation of histology and HER2 signals which does not fade over time. Patient will also benefit from the lower cost and a shorter turn-around-time. We hope this will lead to providing better decision-making process for targeted treatment and management of patient.

00597 Perspectives of Older Nurses in Singapore — A Survey of their Views on Retirement and Re-Employment
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Aims: As part of the Singapore government’s efforts to help older employees remain economically productive, the government has enacted re-employment legislation in 2012 to enable more people to continue working beyond the age of 62. This study aimed to explore older nurses’ views about the re-employment legislation and re-employment opportunities and conditions; as well as ascertain factors which influence older nurses’ decision to extend working life.

Methodology: A cross-sectional survey on all older (aged 50 and above) nurses working in three acute and one step-down care institutions were recruited. The questionnaire was formulated based on a comprehensive literature review and reviewed by human resource experts and senior nursing managers. Average item CVI of 0.89 was achieved. The questionnaire consisted of questions on demographics, general and specific health issues, work-related injuries and challenges, as well as views on re-employment and retirement.

Results: A total of 462 nurses completed the survey (60% response rate). Majority were females (97%), Chinese (69%), and married (73%), with an average age of 57 (SD 4.8) and worked for an average of 35 years (SD 8.5) as a nurse. Majority believed (85%) and wanted (85%) to work beyond 60 years old. Respondents reported that the top 3 factors which would increase the probability of them working longer or seeking re-employment were “same salary and benefits” (77–79%), “flexible working hours” (64–68%), and “shorter working hours” (37–38%). Most were aware of the re-employment act (75%) but only 61% were familiar with the process and practices for re-employment. 43% do not think that they have saved enough for their retirement while 48% believed that their family cannot support their retirement plans.

Conclusion: Older nurses want to work beyond 60 years of age. To retain older nurses, workforce strategies need to take into account nurses’ need to remain financially independent and preferences for working hours and schedule.

00608 Computerised One-stop Parenteral Nutrition Calculation and Online Ordering Reduced Parenteral Nutrition Prescription Time while Reducing Errors in a Neonatal ICU
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Aims: 1) To improve the efficacy and efficiency in TPN prescription; 2) To improve precision and minimise TPN prescription errors

Methodology: Audit of all neonates requiring PN admitted to Singapore General Hospital Neonatal Intensive Care Unit (NICU) over two 10 day periods before and after the intervention. We studied the time spend for total TPN prescription, individual PN prescriptions, and frequency for subsequent PN rate adjustment. Historical controls required 2-step methods, with initial manual calculations on paper and subsequent transcribing into an existing online PN system. The intervention group used a new one-stop PN ordering system, designed with the functions of automated volume, composite, osmolality and calories calculation, instant counter-checking, incorporated into online medication, and nutrition prescription platform.

Results: There was a total of 112 set of prescriptions, 63 orders in the intervention group and 49 in the control group. The number of PN orders per day was not significantly different, 4.4 and 4.5 respectively for controls and intervention. Physicians took an average of 73.7 minutes to complete the TPN prescription during the control period. This was significantly reduced to 64.2 minutes ($p = 0.23$) after the intervention. Frequency of PN rate adjustment was reduced from 6.4 episodes per day to 0.5 per
day during the control and intervention periods respectively. There was no medication errors reported during both study periods.

**Conclusion:** The one-stop TPN order system reduced TPN prescription time by 12.9% and significantly decreased need for PN rate adjustment by 92.9%.

**00609**  
**KK Hospital’s Experience Using a Standardised Protocol for Administration of Denosumab for Treatment of Post-menopausal Osteoporosis**  
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**Aims:** Denosumab is a human monoclonal antibody and novel anti-resorptive agent designed to inhibit RANKL. It is approved for treatment of post-menopausal osteoporosis. Denosumab is associated with a lower incidence of acute-phase reactions and can be used in patients with impaired renal function. It is also useful for patients with GI complications related to Bisphosphonate use. With 6 monthly subcutaneous dosing, compliance is also thought to be better than orally administered medications. Known side effects include hypocalcaemia, eczema, cellulitis, rashes, and arthralgia. Denosumab is also associated with osteonecrosis of the jaw. This paper reports our experience with the use of a standardised protocol for administration of Denosumab for treatment of post-menopausal women with osteoporosis in KKH. This protocol was developed with the intention of ensuring safe drug administration and follow up of patients.

**Methodology:** The Denosumab protocol includes evaluation of the patient’s skin and dental condition and pre-screening laboratory tests (calcium, phosphate, and renal and liver panel). Creatinine Clearance must be ≥ 35 ml/min. Pre-treatment, patients were also prescribed sufficient calcium and vitamin D. Patients were followed-up with phone call by a designated nurse 2 days post-injection for toleration and side effects, and were reviewed by a Family Medicine Advanced Practice Nurse (Intern) 2 weeks later to assess concerns and side effects.

**Results:** 80 patients with osteoporosis were prescribed subcutaneous Denosumab injection from 2012 to April 2014. The age range 50–91, with mean of 69.85. Majority were Chinese 95% (76), 3.75% (3) Indian, and 1.25% (1) Malay. The commonest reported side effects were mild body ache 10% (8), chills 3.75% (3), fever 1.25% (1), and pruritis 1.25% (1). 4 patients were discontinuing Denosumab due to deterioration of other comorbidities, e.g. CVA and AMI.

**Conclusion:** In our experience, Denosumab is safe with minimum and well-tolerated in post-menopausal osteoporosis.

**00621**  
**An Audit of the Learning and Behaviour Track in the Department of Child Development in KK Women’s and Children’s Hospital**  
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**Aims:** The Learning and Behaviour (LB) track, started in January 2012 in the Department of Child Development in KKH, provides developmental and behavioural care for kindergarten children. This audit aims to formulate a database estimating prevalence and severity of learning and behavioural disorders, monitor progress, assess quality of evaluation, resource utilisation, and identify service gaps. It will outline the track as a quality improvement model towards a medical home for children with developmental needs.

**Methodology:** The study period was from 1st January 2013 to 30th June 2013. The electronic case notes were reviewed for baseline demographic data, referral data, consultation notes, management plans, and utilisation of resources. Information was gathered at three points: at the time of 1) triage clinic, 2) LB track review, and 3) LB track clinic visit.

**Results:** The mean age of children seen was 5.1 years (SD 0.6). Mean time between triage and LB visit was 49.3 days (SD 20.4). Majority of the presenting concerns for referral to the DCD triage clinics were in behavioural (65.9%) and academic (47.6%) domains. Majority of academic and language delays were identified at triage, with 1/3 remaining unspecified at the end of the LB clinic visit. A total of 351 resources were used, with 38% at triage, 21% at review, and 41% at LB clinic. The average number of
resources used per child was 4.2. Sleep information was available in 66.7% (n = 56) with sleep problems found in 64.3% (n = 36).

**Conclusion:** The LB track has been effective as a medical home in identifying and evaluating learning and behaviour problems. However there were service gaps in the assessment of academic, language, and sleep problems. We recommend reduction of waiting time for speech & language therapy assessment, identification of a battery of appropriate tests for dyslexia referrals, and effective screening for sleep problems.

**00624 ALK Mutational Testing for F1174L and R1275Q in Clinical Neuroblastomas**

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**Aims:** ALK is an established causative oncogenic driver in neuroblastoma, and is likely to emerge as a routine biomarker in neuroblastoma diagnostics. Patients with neuroblastomas harbouring the ALK F1174L mutation have been reported to have a worse prognosis than those with wild-type ALK. Preclinical in vitro studies have shown that the presence of the ALK R1275Q mutation correlates with sensitivity to crizotinib, while the ALK F1174L mutation correlates with resistance to crizotinib. In this study, we utilised Sanger sequencing to identify ALK F1174L and R1275Q mutations in local neuroblastoma cases.

**Methodology:** Neuroblastoma cases from 2006–2013 were retrieved for Sanger sequencing of ALK exons 23 and 25 for the detection of F1174L and R1275Q mutations. DNA was extracted from formalin-fixed, paraffin-embedded (FFPE) tissues using ReliaPrep® gDNAFFPE kit, Promega. Primers flanking the two hotspots were used to amplify the region of interest. Concurrently, one cell line (LAN5) and three cell line-derived tumour xenografts (SKNF1, SH-SY5Y, and SK-N-SH) were similarly sequenced.

**Results:** Of 53 cases retrieved, 5 (9%) cases had ALK mutations (three F1774L and two R1275Q). The cell line and cell-line derived tumour xenografts results are as follows: LAN5 had the R1275Q ALK mutation, SKNF1 had wild-type ALK, and SH-SY5Y and SK-N-SH had the F1174L ALK mutation.

**Conclusion:** The ALK mutational rate of 9% in local neuroblastoma cases correlates with reported 5–10% ALK mutation rates in neuroblastomas reported in the scientific literature. Both the cell line and cell line-derived tumour xenograft results also corroborate findings reported in the literature. Mutational analysis for ALK F1174L and R1275Q in neuroblastomas is a feasible and clinically relevant predictive test that can be performed in a diagnostic paediatric pathology laboratory.

**00711 Evaluation of Standardised Versus Customised Parenteral Nutrition in Very Low Birth Weight Infants**

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KK Women’s and Children’s Hospital

**Aims:** This study aims to evaluate if implementing standardised parenteral nutrition (PN) resulted in more efficient and accurate ordering while optimising early nutrition intake of premature neonates. Physicians’ opinion on standardised PN was also assessed.

**Methodology:** This is a single-centre, retrospective observational study. Daily protein and caloric intake, weight on Day 14 of life or last day of PN, whichever was earlier, was collected from sixty eight very low birth weight infants from July 2010 to February 2011. Mean number of pharmacist intervention per day between the two groups was also compared. A survey was also done to ascertain physicians’ opinion on the two types of PN.

**Results:** Thirty infants received customised PN and thirty-eight received standardised PN. No significant difference in weight was observed between the two groups on the last day of PN or Day 14 of life suggesting comparable nutrition status. However, mean number of pharmacist intervention after introduction of standardised PN decreased significantly from 3.72 to 0.18 per day. Neonates on standardised PN had higher amino acid and calorie intake in the first three days of life and were able to initiate and achieve full enteral feeding 1.4 and 8 days earlier respectively. However, they received less protein and calories compared to neonates on customised PN at Day 14 of life or last day of PN. More
than 85% of the thirty three physicians surveyed agreed that ordering standard PN was easier, less
time-consuming, and promoted safer prescribing practices. However, optimal macronutrient
requirements may not be achieved with standard PN.

**Conclusion:** Standard PN promotes safer, more efficient ordering, and significantly reduces
pharmacist interventions without causing significant compromise to nutrition status. It is also well
accepted by physicians. Standardised PN bags with higher concentration of amino acids can be
considered to meet the nutritional needs of premature neonates.

**00720**  
**Evaluation of the Economic Impact of Specialist Outpatient Clinic Pharmacy Interventions in a Tertiary Institution, Singapore**  
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Singapore General Hospital

**Aims:** To evaluate the economic impact of Specialist Outpatient Clinic (SOC) Pharmacy interventions.

**Methodology:** A retrospective study in Singapore General Hospital (SGH) SOC Pharmacy on the
interventions made with physicians, between Aug 2012 and Oct 2012. Each intervention was analysed
and assigned with an Estimated Cost of Avoidance (ECA) level, consented to by 3 pharmacists with
varying clinical experience from 2 years to 15 years. The ECA level ranges from 1 to 8, with 1 having the
least economic impact and 7 having the greatest economic impact. An ECA level of 8 has no economic
impact as it signify non-acceptance of interventions by physicians. Subsequently, the economic impact
per month is calculated by the total number of interventions in each ECA level, multiplied by the
respective cost of avoidance, pre-determined for each ECA level based on national / institution
standards, in Singapore Dollars.

**Results:** The economic impact of SOC Pharmacy interventions is estimated to be —SGD 900,000 over
three months, with an average of — SGD 300,000 per month. With an average of 23000 prescriptions
per month, it is estimated that our SOC Pharmacy interventions saves — SGD 13 per prescription.
Unlike traditional, direct methods to estimate the economic impact of pharmacy interventions, our
results highlighted a great portion of cost savings to both institutions and patients, which are often
neglected.

**Conclusion:** Interventions performed by Pharmacy staff have a great impact on cost savings to
institutions and also patients.

**00722**  
**Admission Category Types does not Impact on Parental Satisfaction in the Paediatric Intensive Care Unit**  
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KK Women’s and Children’s Hospital

**Aims:** The aims of this study were to determine whether differences exist in the perception of parents
of elective and emergency patients admitted to the paediatric intensive care unit, to measure
satisfaction with the medical care, and to identify priority areas for improvement.

**Methodology:** We conducted a descriptive quantitative study in a 16-bedded paediatric intensive
care unit (PICU) in KK Women’s and Children’s Hospital, Singapore. All parents whose child was
admitted to the PICU between February and April 2014 were recruited for this study after informed
consent was obtained. Parents who had been included in this study in their previous admission(s) and
whose child passed away in the PICU were not included. We utilised EMPATHIC, a previously validated
questionnaire survey specific for measuring parental satisfaction in PICUs.

**Results:** We obtained a total of 59 responses out of 108 admissions. The elective (55.6%) cases
included cardiovascular (n = 10), gastrointestinal (n = 2), respiratory (n = 2), neurological (n = 5), and
others (n = 7) diagnoses. The emergency (44.4%) cases included cardiovascular (n = 1), gastrointestinal
(n = 6), respiratory (n = 11), metabolic (n = 5), and neurological (n = 10) diagnoses. This study found
that there was no significant difference in the perception of parents whose child was of elective or
emergency admission. On a rating scale of 1–6, the PICU scored well in all of the following domains;
information giving (mean = 5.39), care and cure (mean = 5.45), parental participation (mean = 5.33),
organisation (mean = 5.38), and professional attitude (mean = 5.55). On a scale of 1–10, the rating of doctors (mean = 8.74) and nurses (mean = 8.90) was also highly encouraging.

**Conclusion:** In this small scale study we found that the type of admission had no difference on parental satisfaction. Focusing on parents’ needs during their child’s critically-ill period in all five domains is equally important for both elective and emergency cases.

**00727 Characteristics of SGH Patients Doing Blood Test in Polyclinics: Results from a Survey of Rheumatoid Arthritis and Spondyloarthritis Patients**

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Singapore General Hospital

**Aims:** To characterise patients with rheumatoid arthritis (RA) or spondyloarthritis (SpA) who did their blood test at SingHealth Polyclinics when their condition was monitored off-site.

**Methodology:** Data were derived from an on-going survey study (from November 2013) to evaluate the feasibility of a new model of care for RA/SpA patients – the Virtual Monitoring Clinic (VMC) where patients were monitored off-site by an Advanced Practice Nurse. Patients were asked in the survey where (a Polyclinic or Singapore General Hospital (SGH)) they went for their blood test before their VMC follow-up. Patient socio-demographic characteristics (age, gender, race, and employment status) and their residential postal codes were also obtained. Descriptive analyses were performed using SPSS 17.0.

**Results:** 112 patients (79.5% female, 73% Chinese, 12% Malays, 12% Indians, mean (SD) age: 58.9 (13) years) had completed the survey by the end of March 2014. 35.7% of them did their blood test at polyclinics, and 64.3% returned to SGH. Employment status ($X^2 = 6.1, p = 0.014$) and patient’s residential location ($X^2 = 27.4, p < 0.001$) were associated with patient choice of blood test location. 45.9% of patients who were not working (versus 23.5% who were working) went to a polyclinic for their blood best. 77.3% of patients staying in the East did so, followed by those staying in the Northeast (41.2%), in the Central (30.0 %), and in the West (5.6%). No patient from the North went to a polyclinic for his/her blood test. Users and non-users of polyclinics for blood test did not differ in age, gender, or ethnicity.

**Conclusion:** This study shows that not working and living near a Polyclinic were two defining characteristics of the VMC patients who did their blood test at Polyclinics. The low utilisation rate in the North and in the West was likely due to lack of access to SingHealth Polyclinics in these regions.