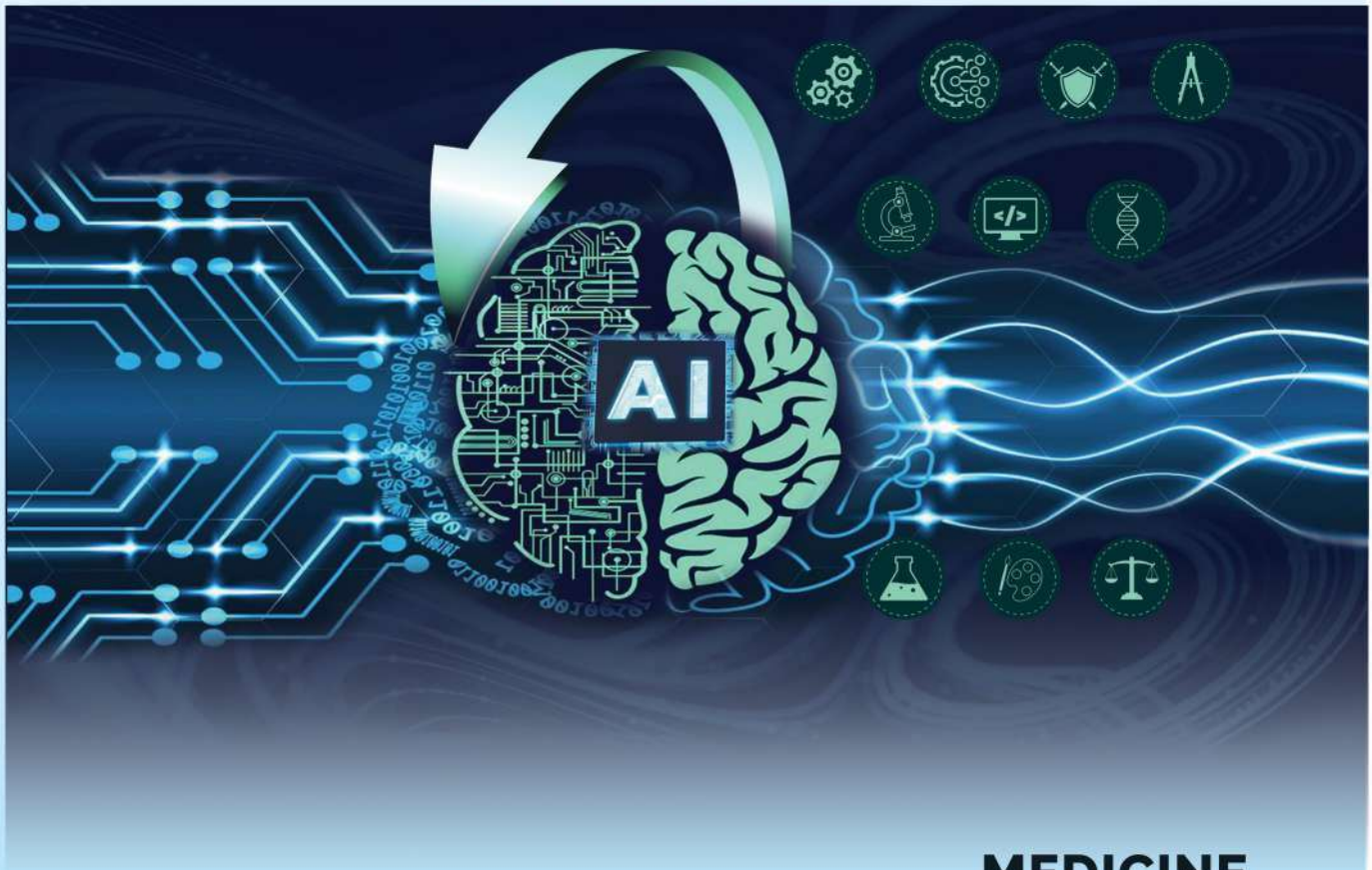




# 17<sup>th</sup> INTERNATIONAL RESEARCH CONFERENCE

*Unravelling the Paradigm Shift:  
Revolutions in the Era of AI*

26<sup>th</sup> - 27<sup>th</sup> SEPTEMBER 2024



**MEDICINE**

**ABSTRACTS**

General Sir John Kotelawala Defence University



## **17<sup>th</sup> INTERNATIONAL RESEARCH CONFERENCE**

UNRAVELLING THE PARADIGM SHIFT: REVOLUTIONS IN THE ERA OF AI

**MEDICINE**

# **ABSTRACTS**



General Sir John Kotelawala Defence University  
Ratmalana, Sri Lanka.

## **KDU PRESS**

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This book contains the abstracts of papers presented at the **Medicine** Sessions of the 17<sup>th</sup> International Research Conference of General Sir John Kotelawala Defence University, Ratmalana, Sri Lanka held on the September 26–27, 2024.

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## Message from the Chief Guest



I am truly honoured to welcome all the distinguished participants to the 17th International Research Conference (IRC) at General Sir John Kotelawala Defence University (KDU). This annually organized conference serves as a unique milestone showcasing the rich research culture deeply embedded within KDU. As a prestigious seat of learning, novelty and innovation remain at the heart of KDU's mission. Therefore, 'Unravelling the Paradigm Shift: Revolutions in the Era of AI' has been chosen as the key theme of IRC 2024.

Moving ahead with the momentum of modern-day research, we are set to uncover the extensive impacts of artificial intelligence, not just in defence but across every facet of national interest. Currently, AI has become a driving force, reforming our defence strategies, transforming healthcare, and restructuring our educational frameworks and infrastructure.

Investing in research is essential for national advancement, promoting innovation, formulating policies, and offering solutions that address our most pressing challenges. Hence, the IRC serves as a vital platform that fosters such great endeavours, contributing significantly to national development. Our responsibility as defenders of national security is profound, extending beyond traditional roles to include the ethical integration of advanced technologies that ensure our nation's safety and prosperity.

KDU stands as a symbol of a rich and diverse research culture across many disciplines. It is also a hub for high-quality research, upholding international standards of academic excellence. This conference represents a critical meeting of minds where leading experts converge to define strategies for our future. Each discussion and presentation at this event is a step toward securing a thriving, prosperous future for our region.

I extend my best wishes to all for a successful and productive conference, eagerly anticipating the innovative ideas and transformative insights that will undoubtedly arise.

**GENERAL SHS KOTTEGODA (Retd) WWV RWP RSP  
VSV USP ndc**  
Chancellor General Sir John Kotelawala Defence University

## Message from the Keynote Speaker



Brain health is a holistic concept encompassing cognitive, sensory, social-emotional, behavioural, and motor functions, enabling individuals to achieve their full potential. With one in three people globally affected by a brain disorder, the urgency for preventive brain health initiatives is evident. Since the inception of World Brain Day in 2014, there has been a renewed global focus on this critical area. The World Federation of Neurology (WFN), in collaboration with key organizations such as the American Academy of Neurology (AAN), the European Academy of Neurology (EAN), and the Asian Regional Consortium of Headaches (ARCH), has led the charge to raise awareness and promote brain health worldwide.

This keynote address will outline the journey of World Brain Day and its impact on the global brain health movement, with a specific focus on prevention. It will explore the evolution of brain health concepts and the alarming prevalence of brain disorders, emphasizing the need for urgent, coordinated action. Central to this effort is the role of artificial intelligence (AI) in enhancing preventive brain health strategies. AI-driven technologies are increasingly being used to predict, diagnose, and monitor brain health conditions, enabling earlier interventions and more personalized approaches to prevention.

The address will highlight the author's pioneering work in community-based programs, public health campaigns, and international collaborations. It will underscore the critical role of prevention, early intervention, and AI-powered tools in improving quality of life and reducing the global burden of brain disorders. The ultimate goal is to advance comprehensive brain health initiatives that leverage cutting-edge technologies to ensure a healthier future for all.

### **Professor Tissa Wijeratne**

DR OAM MD PhD FRACP FRCP(London) FRCP (Edin) FAAN (USA)  
FEAN (EAN) Professor and Chair, Director, Senior Neurologist,  
Department of Neurology, Western Health, Victoria, Australia Co-  
Founder and Co-Chair, World Brain Day, World Federation of  
Neurology

## Message from the Vice-Chancellor



Greetings to all participants, speakers, and guests of the 17th International Research Conference (IRC) at KDU. This year's IRC is centered around a timely theme that has sparked diverse dialogues in the realms of research and innovation. The theme, 'Unravelling the Paradigm Shift: Revolutions in the Era of AI', serves as an eye-opener for both eminent and novice researchers across the globe. It also highlights the critical role that advanced technologies play in shaping our world.

At KDU, we take pride in being at the forefront of defence education in Asia, a distinction affirmed by our high rankings and our pivotal role in shaping global security dialogues. KDU claims to have a unique history of providing high-quality education for both military and civilian students. It also proudly stands as a thriving hub for cutting-edge research that addresses pressing global and national issues. We strongly believe in fostering a rich and diverse research culture among KDU's students and staff, aligned with international standards. Therefore, IRC is recognized as a key event in KDU's annual calendar, emphasizing its significance in the institution's academic and research endeavours.

This year, we aim to explore the revolutionary impacts of AI across diverse disciplines, reaffirming our commitment to leading these discussions on a global scale. The insights shared here will undoubtedly spark new research initiatives and strategic collaborations, enhancing Sri Lanka's stature as a leader in both academic and strategic domains.

I extend my sincere gratitude to all those whose collective efforts have brought this conference to a reality. Your contributions ensure that KDU plays a prominent role in the international arena, driving discussions that will shape the future of technology and strategy. I look forward to a successful event, characterized by insightful discussions and pioneering ideas.

**REAR ADMIRAL HGU DAMMIKA KUMARA, VSV,  
USP, psc, MMaritimePol, BSc (DS)**  
Vice Chancellor General Sir John Kotelawala Defence University

## Message from the Chairperson



It is my honour, as the Chairperson, to welcome you all to the 17th International Research Conference at KDU. This year, we explore how artificial intelligence has evolved from a technological innovation into a catalyst for transformative change across numerous sectors. With an impressive selection of 441 research papers, drawn from nearly 1000 submissions, our conference spans across 11 distinct tracks covering a wide range of disciplines. Our theme, “Unravelling the Paradigm Shift: Revolutions in the Era of AI,” highlights the profound and far-reaching transformations that AI is driving—from reshaping urban infrastructure to revolutionizing healthcare. The conference is designed to promote interdisciplinary dialogue, addressing not only technological advancements but also the ethical, social, and economic implications of these developments. One of our key objectives is to create a platform where researchers, professionals, and thought leaders can come together, exchange ideas, and foster collaborative initiatives that will push the boundaries of innovation. I am deeply grateful to all our keynote speaker and the plenary speakers, other presenters, , participants, and the entire organizing team for their tireless efforts and contributions. Your dedication to advancing knowledge is what brings this conference to life, positioning it as a critical forum in global research. Together, we are charting a path toward a future where technology and society grow hand in hand, reshaping the landscape of not just research but our daily lives. Let’s engage in meaningful discussions that will inspire new perspectives and drive impactful solutions. Here’s to a successful conference, rich in insight and collaboration. Finally, I would like to extend my best wishes to all the presenters, authors, and participants joining the KDU IRC 2024, whether on-site or online. I hope each of you finds this conference not only informative and enjoyable but also an encouraging opportunity to experience the warm hospitality of KDU throughout these two fruitful days.

### **Dr. Niroshta Wedasinghe**

Ph.D(KDU-SL), MIT(CStud-Aus),B.Sc in Comp IS (London Met-UK), SMIEEE(US), MBSC(UK), MCS(SL), FISDS(Japan) Senior Lecturer cum Director -Centre for Gender Equity and Equality General Sir John Kotelawala Defence University Conference Chair-IRC 2024

## Message from the Secretary



As we gather for the 17th International Research Conference at KDU, I extend a warm and heartfelt welcome to all participants, researchers, and thought leaders. This year, we proudly present 441 research papers selected from nearly 1,000 submissions, spanning across 11 tracks in diverse fields such as Defence and Strategic Studies, Medicine, Health Sciences, Engineering, Technology and Computing, Basic sciences, Law, Social Sciences and Humanities, and the Built Environment and Spatial Sciences. Our theme, “Unravelling the Paradigm Shift: Revolutions in the Era of AI,” reflects the profound ways that AI is transforming our world, becoming integral to our lives and work. The discussions here aim to explore how AI can address global challenges, drive innovation, and foster interdisciplinary collaborations that will shape the future. Looking ahead, the future of IRC lies in broadening its horizons. We aim to increase international participation, diversify the scope of research, and establish global research consortia to tackle real-world problems that extend beyond the borders of Sri Lanka. The insights gained here must lead to actionable outcomes, particularly in formulating policy recommendations in areas such as AI in defence, public health, and education. This conference is more than just a forum for discussion; it is a platform where the brightest minds collaborate to drive change. I extend my heartfelt thanks to all our speakers and participants for their dedication and contributions. Together, we are not only shaping the future of research but also crafting solutions that will impact society on a global scale. Here’s to a successful and inspiring conference that drives innovation, shapes policy, and sparks meaningful collaboration.

### **Dr. HM Prasanna Herath**

Ph.D. (USJ), RN(SLNC), B.Sc(Nursing) Hons (UPSL), CTHE Senior Lecturer Faculty of Allied Health Sciences Erasmus coordinator General Sir John Kotelawala Defence University Conference Secretary- IRC 2024



## Message from the Dean



It is my pleasure sending this message for the 17th International Research Conference (IRC) of General Sir John Kotelawala Defence University (KDU) in September 2024. Under the overall theme of ‘unravelling the paradigm shift: Revolutions in the era of AI’ the Faculty of Medicine has coined the theme ‘Changing landscape in medical sciences with artificial intelligence’. With the paradigm shift, facing challenges including that posed by the ‘Gen Z’, it is necessary to be ready to progress in the numerous fields of medicine. With the new insights we will have from the plenaries and the free papers, we can face the challenges realistically and shed light to the world on how to address these issues with the use of new technologies like artificial intelligence.

Over the years, KDU has filled a niche in multidisciplinary research including defence studies and has held the IRC for sixteen years. In the seventeenth year also, we plan to cater to the needs of the academia, researchers, practitioners, the country and the world. Expecting fruitful deliberations and outcomes, I welcome all of you to the 17th IRC of KDU in 2024.

### **Colonel Professor Aindralal Balasuriya**

MBBS (Col), MSc-Community Medicine (Col), MD-Community Medicine (Col), PGDip Buddhist Studies (Homagama), MA Buddhist Studies (Kelaniya) Dean, Faculty of Medicine Chair Professor of Public Health, Faculty of Medicine Consultant Community Physician

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# ORAL PRESENTATIONS

## **Pyocyanin (5-methylphenazin-1-one) Inhibits the Growth of Bacterial Species Colonized on Chronic Diabetic Wounds**

SDAK Wijesinghe<sup>1</sup>, WMID Nakkawita<sup>2</sup>, AD De Silva<sup>2,3</sup>, US Gunwardana<sup>3</sup>, and HS Jayasinghearachchi<sup>4#</sup>

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Pyocyanin (5-methylphenazin-1-one), a blue-green pigment synthesized by *Pseudomonas aeruginosa*, inhibits bacterial and fungal species, but its antimicrobial effect on microbial species colonized on chronic diabetic wounds is limited. In this study, microorganisms isolated from chronic diabetic wounds at the microbiology laboratory at the University Hospital of KDU were grown on Luria Agar plates. Microbial pellet harvested from LA-grown sub-cultures were subjected to Next Generation Sequencing (NGS) with 16S metagenomics sequencing analysis at the Biomedical Laboratory, KDU. Microbial lawns prepared on Muller Hinton Agar (MHA) medium were used for all antimicrobial assays of pyocyanin against wound colonizers. Three concentrations of pyocyanin (23, 45, and 54 µg/ml) were selected. One plate was kept without pyocyanin discs. Microbial lawns were well-grown in plates that did not receive pyocyanin discs. Clear zones with diameters 20.8 mm, 22.0 mm and 24.3 mm were observed surrounding the disks impregnated with 54 µg/ml indicated the complete inhibition of the growth of the microbial colonizers, whereas microbial growth was not completely inhibited by lower concentrations tested (23, 45 µg/ml), and therefore completely clear zones were absent indicating growth of resistant colonizers when used lower concentrations (23, 45 µg/ml). Metagenome analysis showed the highest abundance of microbial colonizers belongs to genera *Acinetobacter*, *Klebsiella*, *Brenneria*, *Photobacterium*, *Pseudomonas*, *Serratia*, *Citrobacter*, *Enterobacter*, and *Cronobacter*. Pyocyanin found to be a good antimicrobial agent and, further investigations should be carried out to identify minimum inhibitory concentration (MIC) for eliminating the harmful microorganisms while retaining beneficial microbial colonizers that support for wound healing process.

**Keywords:** *pyocyanin, chronic diabetic wound colonizers, 16S NGS metagenome analysis, antimicrobial activity*

## Development and Analysis of Searches of a Comprehensive New Digital Database and Search engine (Mediverify) for Registered Medicines in Sri Lanka

PC Athauda Arachchi<sup>1</sup>, BMR Fernandopulle<sup>2</sup>, and PM Athauda Arachchi<sup>2#</sup>

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National Medicines Regulatory Authority (NMRA) of Sri Lanka, vested with the task of registration, deregistration and licensing of all medicines, was urgently in need of a rapidly accessible web application of all registered medicines in Sri Lanka, incorporated into their webpage, enabling rapid digital searches for both regulators and the public when probing for safety. In the paper, we discuss the development of Mediverify.lk (<http://mediverify.lk>) webapp, with a comprehensive database of 11933 currently registered medicines, and describe the functional features of the app that enables rapid search of both generic and trade names of medicines. It is also searchable by Google and other search engines. Analysis of anonymous search results within the first week following the official launch of the app in Sri Lanka (on the 11th of July by the Minister of Health) indicated that it recorded 21710 searches (approximately 3203 searches per day), on 4008 registered medicines. Paracetamol preparations (tablets and pediatric syrups) had the highest frequency of searches (>25.88%), followed by cefuroxime (8.95%), co-amoxiclav (4.05%), amoxicillin (3.48%), atorvastatin (3.28%), losartan (2.91%), metformin (2.55%) and salbutamol (2.26%). Cefuroxime, amoxicillin and co-amoxiclav were the most searched antibiotics. Metformin, atorvastatin and losartan were the most searched medications for non-communicable diseases. The app yielded rapid results, typically in the range of 0.006 seconds for correct syntaxes, and around 2.9 seconds for search on similar (or even when mis-spelt) medicines, highlighting the opportunity to quickly review details of registered medicines in Sri Lanka using this digital platform.

**Keywords:** *digital databases, registered medicines, electronic web application, drug index, Mediverify.lk*

## Antibiogram of Carbapenem-resistant Gram Negative Bacteria Causing Urinary Tract Infections

AWGSN Jayathilaka <sup>1#</sup>, WMID Nakkawita<sup>2</sup>, SP Gunasekara<sup>3</sup>, and UTN Senaratne<sup>4</sup>

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Urinary tract infections (UTI) caused by carbapenem-resistant (CR) Gram-negative bacteria (GNB), is a serious problem in clinical settings. Previous studies were conducted on the antibiogram of antibiotic-resistant bacteria. However, a recent update on CR-GNB in Sri Lanka is unavailable. Organisms were identified by biochemical tests and antibiotic susceptibility patterns. A total of 99 meropenem and/or imipenem-resistant isolates by disc diffusion method were collected from January to December 2023 at the University Hospital, Kotelawala Defence University and Apeksha Hospital. The majority were CR Enterobacteriaceae (CRE) (57.6%) followed by CR *Pseudomonas* spp. (CRP) (19.2%), CR *Acinetobacter* spp. (CRA) (15.2%) and other CR-GNB (8.1%). Beta-lactam sensitivity among organism groups was <20%. Among CRE, sensitivity to at least one of the aminoglycosides, quinolones, nitrofurans, and sulfonamides was 21.49%, 9.89%, 18.06% and 12.83%. respectively. CRP were sensitive to aminoglycosides (20.02%), quinolones (9.72%), and sulfonamides (3.34%). All CRA were 100.00% resistant to quinolones, nitrofurans, and sulfonamides while 15.00% sensitive to aminoglycosides. Cefoperazone-sulbactam sensitivity was 3.34% and 12.83% in CRP and CRE while 0.00% in other CR-GNB and CRA. The sensitivity of other CR-GNB to aminoglycosides, quinolones, nitrofurans, and sulfonamides were 41.66%, 44.45%, 0.00% and 0.00% respectively. CRE, CRP, and CRA showed 100% sensitivity to colistin and polymyxin-B except for CR-GNB which showed 100% resistance. Antibiotic sensitivities didn't differ statistically among different organism groups ( $p>0.05$ ). High antibiotic resistance rates were observed among CR-GNB, resulting in limited antibiotic options. Robust infection control measures and prudent use of last-resort antibiotics should be implemented to combat CR-GNB threat in Sri Lanka.

**Keywords:** *antibiotic resistance, carbapenem resistance, Gram negative bacteria, Sri Lanka, urinary tract infections*

## Oxford Nanopore Sequencing for Preliminary Microbiome Analysis Amongst Active/Latent Tuberculosis Patients vs Healthy Individuals in Sri Lanka

US Gunawardane<sup>1#</sup>, MR Peiris<sup>1</sup>, DS Kathriarachchi<sup>1</sup>, DKR Aluthge<sup>1</sup>, GDHM Gunasekara<sup>1</sup>, DGP Kawyangana<sup>1</sup>, MA Balasuriya<sup>1</sup>, SAV Moorthy<sup>1</sup>, W Gunasinghe<sup>2</sup>, TI Withanawasam<sup>1</sup>, N Dissanayake<sup>3</sup>, A Balasuriya<sup>1</sup>, B Peters<sup>4</sup>, CS Lindestam Arlehamn<sup>4</sup>, and AD De Silva<sup>1,4</sup>

<sup>1</sup>General Sir John Kotelawala Defence University, Sri Lanka

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The human microbiome has long been considered to play a vital role in the immune response against infections including Tuberculosis (TB). However, even with an annual disease burden of 8000 cases, the gut and oral microbiome of Sri Lankan TB patients are yet to be studied. Moreover, currently prominent sequencing technologies used for generating microbiome data namely; Illumina and Ion Torrent require sophisticated instrumentation in contrast to the more feasible Oxford Nanopore sequencing technology (ONT). Thus, this study focused on observing the microbial diversity in oral and gut microbiome among TB patients and healthy individuals in Sri Lanka via 16S rRNA gene analysis using ONT. Microbial DNA was extracted from sputum and stool samples of TB infected individuals (n=5) who were tested positive for TB interferon-gamma release assay (IGRA) and IGRA (-) healthy individuals (n=5) using Qiagen QIAmp microbiome kit which were then sequenced using ONT via 16S barcoding followed by bioinformatics analysis using EPI2ME software. A total of 115 genera were identified from sputum samples of both study groups with Gemella, Granulicatella, Streptococcus, Veillonella being the most dominant while 150 genera were identified in stool samples of both cohorts where genera Blautia, Faecalibacterium, Streptococcus were the most abundant. No compositional changes were observed between microbiomes of TB infected and healthy individuals albeit the infected cohort having lower read counts. However, optimisation of ONT workflow to increase the read counts is continuing and a larger sample size is needed to obtain more comprehensive microbiome profiles for both the cohorts studied.

**Keywords:** *tuberculosis, microbiome, Oxford Nanopore sequencing, 16S rRNA gene analysis*

## **Identification of Intrathoracic Pathological Conditions in Chest X-rays Using Deep Learning and Digital Image Processing**

JDBK Jayakody<sup>1#</sup>, J Thussitha<sup>1</sup>, WK Udayanga<sup>1</sup>, M Janotheepan<sup>1</sup>, T Rajeetha<sup>1</sup>, and WKC Sampath<sup>2</sup>

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The interpretation of chest X-rays plays a pivotal role in diagnosing various intrathoracic pathological conditions. Traditionally, this task has heavily depended on the expertise of radiologists and clinicians, often leading to delays and subjective variability in displaying the results. With recent advancements in Deep Learning and Digital Image Processing, there is a promising opportunity to enhance the accuracy, efficiency, and speed of diagnosing these conditions. This study focused on the development and evaluation of an automated system for detecting intrathoracic pathologies in chest X-ray images, particularly for pneumonia, pleural effusion, and cardiomegaly. Deep learning models including VGG-16 and a custom Convolutional Neural Network (based on AlexNet), designed with the Sequential API in Keras, were utilized for the analysis. The dataset comprised of both primary and secondary chest X-ray images, which were meticulously pre-processed through techniques such as resizing and normalization. Model training involved fine-tuning hyperparameters, selecting optimizers, and optimizing loss functions to maximize predictive performance while minimizing overfitting. Both the VGG-16 and custom CNN models achieved an accuracy of 0.79. Considering the balance between precision and recall, the VGG-16 model appears to be slightly more suitable for chest X-ray identification, particularly for its better performance in detecting Pleural Effusion and Cardiomegaly. The customized model also performed well, especially in identifying normal cases and has almost equivalent performance in detecting Pneumonia. These findings underscore the potential of deep learning models in revolutionizing chest X-ray analysis, offering the possibility of improved patient outcomes and more efficient diagnostic processes.

**Keywords:** *chest X-rays, convolutional neural network, VGG-16*

**Bleeding events among elderly antiplatelet users: Are we overprescribing?**

DA Lamabadusuriya<sup>1#</sup>, PU Jayawardene<sup>1</sup>, TPS Perera<sup>1</sup>, BGDS Govidapala<sup>2</sup>, MMPT Jayasekara<sup>1</sup>, and N Fernando<sup>3</sup>

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The elderly population is more susceptible to major adverse cardiac events and hence antiplatelets are frequently prescribed. Balancing the benefit of preventing thrombotic events versus eliminating the risk of bleeding can be challenging in the geriatric population. The objective was to determine the incidence of bleeding events and inappropriate use of antiplatelets among the elderly population attending clinics at University Hospital KDU. This was a retrospective study, which extracted data from 209 patients, over the age of 60 who had been on an antiplatelet medication for at least one year, via interviews and medical records. The frequency distribution of variables was presented as percentages. Associations were analyzed for significance using the Chi-square test with a 95% confidence interval. The study population included 51.7%(n=108) males and 48.3%(n=101) females. The incidence of total bleeding events was 38.3% (n=80). Dual antiplatelets were used by 23.4%(n=49) of the population and 76.6%(n=160) of the population was on a single antiplatelet. Among those 21.3%(n=17) were admitted to the hospital. Cutaneous bleeding, reported in 22.5% (n=47) is the commonest bleeding manifestation. The prescribing error rate was 22.5%(n=47). Dual antiplatelet therapy was erroneously continued beyond the recommended period for 24(51%) patients after myocardial infarction, in 3(6.4%), following percutaneous intervention, in 1(2.1%) following minor stroke and in 2 (4.3%) following stroke. Sixteen (n=34%) patients more than 70 years old were given antiplatelets as a primary prevention. One patient (2.1%) was prescribed antiplatelet despite having<10% 10-year cardiovascular risk. One in five elderly patients were erroneously continued on antiplatelets. Being updated with current guidelines on antiplatelet use as well as regular review of medication will prevent bleeding events due to overprescribing.

**Keywords:** *geriatric population, antiplatelets, prescribing errors*



## Healthcare Costs and Related Factors of a Patient Attending a Medical Clinic of a Tertiary Care Government Hospital in Sri Lanka

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Most Sri Lankan studies that determined healthcare costs have been restricted to inpatient care. Our objective was to calculate the healthcare costs and related factors of a patient attending a medical clinic at Teaching Hospital Karapitiya. Our study was a descriptive cross-sectional study with a cost analysis component. Data was collected from randomly selected 277 patients by an interviewer-administered questionnaire and a data sheet during October 2023. Costs for medicine and investigations were calculated by obtaining data from clinic books and available price lists. The results revealed that 71.4% of patients were unemployed without any source of income of their own. The average distance to the hospital was 16.4km. Public transport was used by 77.2% of the patients. The average travel cost for a patient for one month was Rs 360 whereas the average loss of income for a patient per month was Rs 40. The average monthly cost incurred by the hospital for a patient's medications was Rs 918. The average monthly cost for the investigations for a patient incurred by the hospital was Rs 266.30. Meanwhile on average a patient spent Rs 434 and Rs 333 respectively per month to buy medicine from outside and for investigations ordered from outside. The results indicate that 32% of the medicine cost and 55% of the investigation cost were spent out of patient pocket. The results indicate that patients who seek free healthcare services from outpatient departments bear a significant out-of-pocket expenditure despite their financial dependence considering the costs for medicine and investigations.

**Keywords:** *healthcare cost, out-of-pocket expenditure, medical clinic*

## Biological Predictors of DHS Implant Failure in Extracapsular Neck of Femur Fractures: A 10-year Follow-Up Study

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Fractures of the Extracapsular Neck of the Femur (ENoF) are common among the elderly, with a considerable morbidity and mortality rate. Surgical fixation with a dynamic hip screw (DHS) is the most economical and commonly used surgical intervention. Follow-up studies related to surgical outcomes have not been published in Sri Lanka. The study assessed the predictive value of biological parameters recorded on admission in predicting DHS implant failure. A descriptive longitudinal study was conducted on a cohort of patients (n=514). Biological parameters on admission and surgical outcomes in the 2nd, 5th, and 10th postoperative years were assessed. Biological parameters were compared between implant-failure (n= 259) and non-failure groups (n= 255) using t-tests and logistic regression analysis to find their association with surgical outcomes and prognostic values, respectively. Statistically significant associations were found between implant failure and higher weight, BMI (p=0.000) and lower BMD Spine, BMDFN, TScO FN (p=0.000), and TScO Spine (p=0.006). Further, BMD Spine, BMDFN, TscO FN and TscO Spine were identified as statistically significant predictors of implant failure (p<0.05). The stepwise regression indicated that except body weight and age, all the other biological parameters are useful for predicting implant failure. ROC curve showed 86% potential to predict the failure of DHS implants by the prognostically significant parameters. The study concludes that some of the on-admission biological parameters of patients with ENoF have the potential to predict the surgical outcomes following DHS implants. The parameters which reflect the bone mineral density of the femur neck and spine are the most predictive variables of implant failure.

**Keywords:** *fracture neck of femur, DHS implant failure, bone mineral density*

## Survival Analysis of Fracture Complications Following Dynamic Hip Screw Fixation of Fracture Neck of Femur: A Ten-Year Follow-up Study

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Abstract Extracapsular fracture neck of the femur (ENOF) is a common injury among elderly patients in Sri Lanka. Open reduction and surgical fixation with a Dynamic Hip Screw (DHS) are the most commonly used surgical interventions. Fracture complications and implant failures affect patient mobility and also it affects the patient's family, and society psychosocially. The literature contains minimal studies related to DHS implant failures. No follow-up studies on fracture complications and implant survival following DHS fixation for ENOF has been published in Sri Lanka. A survival analysis of fracture complications over ten years following DHS implant for ENOF and their association with DHS implant failure was studied. A descriptive longitudinal study was conducted on a cohort of patients (n=514). Fracture complications were assessed radiologically in the 2nd, 5th, and 10th postoperative years and compared between implant-failure (n= 259) and non-failure patients (n= 255). The fracture complications studied included non-union, malunion, metal loosening, over-collapsed fractures, and DHS screw cut-off. Kaplan Meier survival time analysis was done for all fracture complications. The median survival time for all fracture complications was 15 months. The median survival times in months for non-union was 7; malunion 12; metal loosening 10; over-collapsed fractures 15 and DHS screw cut off 10. The Chi-square test showed a statistically significant association between all fracture complications and implant failure (p <0.001). Fracture complications following DHS implant for EFNF were positively correlated with implant failure. Over-collapsed fractures and non-union had the longest and shortest survival times, respectively. Further studies are recommended to minimize fracture complications and to improve implant survival.

**Keywords:** *fracture neck of femur, DHS fracture complications, implant failure*

## Positioning of Dynamic Hip Screw as a Predictor of Implant-Failure Following Fracture Neck of Femur: A Survival Analysis of 10 Years

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Surgical fixation of fractures of the extracapsular neck of the femur (ENoF) with a dynamic hip screw (DHS) is a standard procedure performed. The position of DHS is considered a crucial determinant of fracture stability and healing. Minimal studies were found in the literature on the positioning of DHS as a predictor of implant failure. The study assessed the predictive value of the surgical position of DHS on implant failure, measured utilizing radiological parameters. A descriptive longitudinal study was conducted on a cohort of patients (n=514). The surgical outcomes of implant-failure and non-failure groups were assessed in the 2nd, 5th, and 10th postoperative years. Radiological parameters were assessed and compared between the two groups. The null hypothesis was tested using the Wilcoxon rank-sum test. TAD (AP/Lat), TSDAP (AP/Lat) and NSA (AP) distances were significantly higher ( $p < 0.000$ ) in the implant-failure group (n=259) in comparison to the non-failure group (n=255). Statistically significant differences in the radiological variables were found between the two groups  $z = -19.7$ ,  $\text{Prob} > z = 0.0000$ . TAD, TSD (AP), TSD (Lat) and NSA (AP) were predictive of implant failure. Standardized coefficients regression indicated that the most important variables for predicting implant failure are TSDL at (-0.110) and TSDAP (-0.067). The position of the DHS is concluded to be a critical determinant of the implant's stability and survival. TSD (Lat) and TSD (AP) predicted implant failure. Femur neck screw position in the central zone in the lateral view and the central zone or central inferior zone screw placement in the anterior view did not associate with implant failure.

**Keywords:** *fracture neck of femur, Dynamic Hip Screw (DHS), implant failure, radiological parameters of DHS position*

# POSTER PRESENTATIONS

## **In vitro Susceptibility of Carbapenem-resistant Gram-negative Organisms to the Novel Antibiotic Ceftazidime-avibactam**

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The prevalence of carbapenem-resistant Gram-negative organisms is increasing globally and locally. Colistin is the only last-line antibiotic currently available in Sri Lanka for serious infections with carbapenem-resistant Gram-negatives. Alternative treatment options and colistin-sparing regimens for patients with serious infections caused by Multi-Drug Resistant (MDR) organisms are urgently needed. The study aimed to assess the sensitivity of ceftazidime-avibactam to previously identified carbapenem-resistant Gram-negative organisms isolated from urine cultures received at the microbiology laboratory at University Hospital KDU, Sri Lanka. Disc diffusion testing was performed on 59 Carbapenem-Resistant Enterobacteriaceae (CRE) and 19 Carbapenem-Resistant Pseudomonas (CRP) isolates using ceftazidime-avibactam, 30/20µg disc (Oxoid™), and Muller Hinton agar plates according to the CLSI method. Disc diameters were interpreted according to CLSI 2024 breakpoints. Quality control of the ceftazidime-avibactam disc was done using *Escherichia coli* ATCC 25922 strains. Of the 59 CRE isolates, 55.9% (33) were sensitive, while 44.1% (26) were resistant to ceftazidime avibactam. Among the 19 CRP isolates, only 10.5% (2) were sensitive, while 89.5% (17) were resistant. There were 04 CRE isolates, and a 01 CRP isolate among the resistant category which measured a disc diameter of 20mm each and needed to be confirmed by Minimum Inhibitory Concentration (MIC) testing according to CLSI 2024. According to this preliminary study in vitro. sensitivity of ceftazidime avibactam to CRE was relatively good compared to the CRP group. Species identification and molecular detection of different carbapenemase genes that are responsible for carbapenem resistance among each species will provide additional information in making decisions to target this novel antibiotic to the correct organism in treating serious infections caused by carbapenem-resistant organisms.

**Keywords:** *Ceftazidime-avibactam, antibiotic sensitivity, Carbapenem-Resistant Enterobacteriaceae, Sri Lanka*

## Screening and Awareness Of Chronic Kidney Disease (CKD) In a Selected Population Attending a Tertiary Care Hospital in a Lower Middle-income Country

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Chronic Kidney Disease (CKD) is a growing problem in Sri Lanka, with the contribution of diabetes and hypertension. It has given a major economic burden to the families with such patients. Believing that relatives of CKD patients on dialysis are aware of CKD, we surveyed relatives of dialysis patients and hospital staff for CKD and its awareness. A cross-sectional survey amongst volunteers (relatives of CKD patients on regular haemodialysis, medical clinic patients and hospital staff) was conducted on World Kidney Day 2023 at the University Hospital KDU. Data was collected on an interviewer-administered questionnaire, which was face-validated by two subject specialists. Basic screening investigations (serum creatinine, fasting blood sugar and urine full report) were done to identify patients. Detecting criteria of CKD grade 3 was eGFR <60 ml/min/1.732 with evidence of kidney damage and high blood pressure of >140/90 mmHg in three consecutive readings. Hypertensive patients had their medication 3 hours before the screening time. An independent sample student's t-test was used to compare the means, and the Chi-square test was used to analyze the discrete variables. There were 74 participants (35(47.3%) males) (48(64.9%) relatives, 9(12%) clinic patients and 17(23%) healthy hospital staff) with a mean age of 54.85+ 4.53 years among relatives, 63.33+8.71 years among clinic patients and 36.13+5.37 years among hospital staff. Eighteen (12 relatives, 6 clinic patients) had poorly controlled blood pressure. One staff member was newly detected as hypertensive. CKD unawareness was significant among relatives (9) compared to staff (8) (p=0.04). CKD stage 3 was newly detected in six (8.1%) participants (3 relatives, 2 clinic patient and 1 staff member). Awareness of CKD is low in relatives of CKD patients. We recommend having a survey on a larger population of CKD.

**Keywords:** *chronic kidney disease, hypertension, creatinine*

## A Case Report: Severe Haemolytic Disease of the Foetus and Prolonged Anaemia in Newborn Due to Rhesus D (Rh D) Antibody

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Severe Haemolytic Disease of Foetus and new-born (HDFN) due to Anti D is uncommon with Anti D prophylaxis. Prolonged anaemia is rarely reported in severe HDFN treated with Intra Uterine Transfusions (IUT). An O RhD negative mother, who had previously affected a baby, was presented at fourth pregnancy with anti-D alloimmunization. Initial anti-D titer was 1:64. Fetal Middle Cerebral Artery Peak Systolic Velocity was >1.5 multiples of the median at 24 weeks. Five cycles of IUT was done. Foetus was O RhD positive. Direct Antiglobulin Test (DAT) was positive. Titer increased to 1:512. At 28 weeks, anti-C was detected additionally. The baby was delivered in 35 weeks. On day one, the Haemoglobin level was 6.9g/dl, platelet count was 27,000/mm<sup>3</sup>, reticulocyte count was 2.3%, and the bilirubin rate was 104.6mg/dl. DAT was negative. Red cells were transfused to correct anaemia. Indirect bilirubin was rising during day one; therefore, double-volume exchange transfusions were done twice. Phototherapy was continued. The baby was discharged on D12 with haematinics. After 1.5 months, the baby was re-admitted with spherocytic haemolytic anaemia (Haemoglobin 5.6g/dl), elevated Lactate dehydrogenase; reticulocyte count of 16.2% and abilirubin rate of 3.8mg/dl. Anti-D, C was detected in breast milk. The baby was treated with red cells and haematinics. At 2 months, the haemoglobin count was 6g/dl and the reticulocyte count was 11.8% with haemolytic picture. Ferritin was 2500 ng/ml. The baby was clinically observed. The haemoglobin count was 12g/dl by the 4th month. Literature showed anti-D has caused prolonged anaemia with breast feeding due to Anti D. This baby's anaemia supports continued haemolysis. Prolonged anaemia should be managed with careful evaluation. Breast feeding could be withheld considering the risks vs benefits. Transfusions should be given according to iron status.

**Keywords:** *anti D alloimmunization, haemolytic disease of newborn, anaemia*



## Cranial Volume Change – Best Measure for Surgical Outcome in Craniosynostosis

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Cephalic index classifies the types of craniosynostosis. Increasing the cranial volume is a main objective when operating in such children. However, there is little understanding on how these two values change relative to preoperative values after standard surgery. A sample of patients (n=18) who underwent surgery for craniosynostosis from 2017 to 2024 were reviewed and cranial length, width and height were calculated using CT / MRI scans before and after surgery. The pre and post operative cranial index and intracranial volume were calculated and compared. Intracranial volume was calculated using the following validated equation – for males =  $0.000337 (L-11) (B-11) (H-11) + 406.01 \text{ cm}^3$  and for females =  $0.000400 (L-11) (B-11) (H-11) + 206.60 \text{ cm}^3$  (L= Maximum Antero Posterior diameter, B = Eurion to Eurion diameter, H= Auricular height). Pre-operatively 12 (66.67%) had brachycephaly, 4 (22.22%) had normocephaly and 2 (11.11%) had scaphocephaly while post-operatively 13 (72.22%) had brachycephaly, 5 (27.78%) had normocephaly and none had scaphocephaly. After surgery 3 (16.67%) were transitioned to normocephaly. Average calculated intracranial volume before surgery was 803.82 cm<sup>3</sup> and after surgery 914.24 cm<sup>3</sup> (13.73% increase in the average volume). Only one (5.56%) patient had a slight reduction in volume (0.89 cm<sup>3</sup>) while the rest (n=17, 94.44%) had an increase. Cranial volume increased while normocephaly was not achieved in most. Intracranial volume change focusing on assessing reduction in intracranial pressure while CI looks at cosmesis. A larger sample study is necessary to substantiate our findings.

**Keywords:** *craniosynostosis, surgical outcome, volume change, cephalic index, cranial expansion*

## Prophage Diversity and Conservation in *Burkholderia Pseudomallei*: Implications for Virulence and Environmental Adaptation

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*Burkholderia pseudomallei* is an environment bacterium that often caused potentially fatal disease melioidosis. Genetic diversity of environment isolates was largely unknown despite of almost all infections emerging from environmental exposure. Prophage DNA acquired via horizontal gene transfer significantly contributes to genetic diversity, virulence and environment adaptability. In this study, nine whole genome sequences of Sri Lankan clinical isolates and 50 clinical isolates from other geographic origins (Australia, India, Thailand, China, Malaysia, Taiwan) were analyzed for prophages using PHASTEST online tool. Hypothetical proteins in intact prophages used NCBI protein BLAST. The whole genome sequences were downloaded in FASTA format from NCBI. Diversity of intact prophages were high in the genomes of *B. pseudomallei* reported from Australia, Thailand as compared to that of from Sri Lanka. The most commonly detected intact prophages include PHAGE\_Burkho\_phi52237\_NC\_007145, PHAGE\_Burkho\_phiE202\_NC\_009234, PHAGE\_Burkho\_KL3\_NC\_015266, PHAGE\_Burkho\_phiE12\_2\_NC\_009236, PHAGE\_Bacill\_AR9\_NC\_031039, PHAGE\_Burkho\_KS10\_NC\_011216C, PHAGE\_Burkho\_KS10\_NC\_011216, PHAGE\_Burkho\_phi1026b\_NC\_005284, PHAGE\_Enterо\_Arya\_NC\_031048, and PHAGE\_Escher\_vB\_EcoM\_ECO1230\_10\_NC\_027995. Comparative genome analysis of prophage DNA showed co-evolutionary relationship of intact prophages in *B. pseudomallei* from various geographic regions. PHAGE\_Burkho\_phiE202\_NC\_009234 was the most common intact prophage found in Sri Lankan isolates. Further, results in this study indicated that highly conserved prophage proteins were present among different strains. Presence of marR, BrnI family toxin immunity 32, PAAR motif genes suggest they might play key roles in *B. pseudomallei*'s prophage acquisition, virulence, and adaptation. Phylogenetic analysis demonstrated a co-evolutionary relationship among strains with different geographic origins. This high conservation indicates that prophages play a crucial role in the genetic diversity, virulence, and environmental adaptability of *B. pseudomallei*.

**Keywords:** *Burkholderia pseudomallei*, melioidosis, prophage diversity, co-evolutionary relationship, comparative genome analysis, Sri Lanka

## Viruses causing Severe Acute Respiratory Illness (SARI) and Influenza Like Illness (ILI) in adult patients at a teaching hospital in Sri Lanka

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The WHO global influenza surveillance standards define the surveillance case definitions for ILI and SARI. Early and rapid detection of respiratory viruses causing these illnesses is important in minimizing unnecessary antibiotic prescriptions and early commencement of antiviral therapy for selected patients. The study aimed to identify the common respiratory viruses in patients presented with SARI and ILI. Nasopharyngeal swab specimens collected from consented adult patients presented to the University Hospital of Kotelawala Defense University with SARI and ILI were tested for respiratory pathogens by a real-time multiplex PCR. Of the 114 patients, 79.8%(91/114) were SARI and 20.2%(23/114) were ILI patients. Of 114 specimens tested, 66.7%(76/114) were PCR-positive for a bacterial or viral pathogen. PCR-positive rates of SARI and ILI patients were 68.13%(62/91) and 60.87%(14/23) respectively. Of the positive specimens, 65.78%(50/76) were positive for viruses. Mono viral infection was detected in 52%(26/50) patients while coinfection with other viruses was observed in 12%(06/50). Co-infections/colonization with bacteria were present in 36%(18/50) patients. The type of viruses detected in 50 virus positive specimens were SARS CoV-2 38%(19/50), Influenza A 24%(12/50), Parainfluenza virus 22%(11/50), Human Rhinovirus /Enterovirus 18%(09/50), Adenovirus 14%(07/50), Respiratory Syncytial Virus 12%(06/50), Boca virus 8%(04/50), Influenza B 6%(03/50), and metapneumovirus 2%(01/50). At least one viral respiratory pathogen was detected in 43.8%(50/114) of the specimens. Rapid diagnosis of causative agents and careful selection of patients who need antibiotics and antivirals are needed. Clinical correlation of molecular test results is also important in deciding antimicrobial therapy since some viral and bacterial pathogens may represent colonization.

**Keywords:** *respiratory viruses, severe acute respiratory illness, influenza like illness, Sri Lanka*

## Dietary Intake and Nutritional Status of Adolescents

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Adolescents' dietary habits significantly impact long-term health outcomes as proper nutrition is crucial for growth, brain development and overall health. An increased consumption of processed food with reduced fruit, vegetables and whole grains have become an emerging issue among adolescents. This study aimed to assess the dietary intake of 15 to 16-year-old school children in Okkampitiya village, Monaragala district, Sri Lanka. A seven-day diet diary method was employed, where 95 participants completed a structured data sheet detailing their daily food consumption with the portion sizes for seven consecutive days. An initial training and expertise assistance was given for the participants on completing the diet diaries. Data were categorized based on Sri Lankan food-based dietary guidelines. The average number of daily servings of the study group was estimated for each food group. Preliminary analysis indicated an average number of daily servings for respective food groups; cereal and starchy food, legume and pulses, fruit, vegetable, fish, egg, lean meat and milk and dairy products as 12.2, 0.5, 0.4, 1.6, 1.3, 0.6. Sugar and sweets, as well as oily nuts, fats and oils were reported infrequently. These findings indicate an average cereal and starchy food intake of the study group within the recommended number of servings per day while legumes and pulses, fruit, vegetable, fish, egg and lean meat consumption were lower than the recommendations. This emphasizes the potential imbalances in nutrient intake and the need for dietary interventions to promote healthier eating habits among adolescents in the region.

**Keywords:** *adolescents, diet diary, serving size*

PLATINUM PARTNERS



GOLD PARTNER



CO-PARTNERS



TECHNICAL PARTNER



MEDIA PARTNERS



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