

## Systematic Review and Meta-analyses in Perioperative and Intensive Care Medicine

We are internationally recognised for our systematic synthesis of the medical literature for interventions, diagnostic tests, risk prediction models, health economics and healthcare systems in perioperative and intensive care medicine. The group is working closely with the Cochrane Collaboration Anaesthesia, Critical and Emergency Care Group, with a leading role in Asia.

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## Translational Genomics

Our team is experienced in conducting cancer genomics and cancer biology studies for the identification of novel biomarkers and druggable targets. Our ongoing research work includes the meta-analysis of cancer genomic data, genetic association studies by targeted genotyping and capture sequencing, and the use of next-generation sequencing for identifying novel pathogens and biomarkers in sepsis.

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## Anaesthesia and Intensive Care

The vision and mission of the Department of Anaesthesia and Intensive Care is to advance scientific knowledge through basic science and clinical research that leads to excellence of care for patients in the domain of anaesthesia and intensive care. Our aim is to continuously improve, seek opportunities in education and research, and become local and international leaders in our respective disciplines.

The Department is based at the Prince of Wales Hospital (PWH). As a tertiary referral teaching hospital, PWH has 16 operating theatres where more than 11,000 operations are performed in a year and a 23-bed intensive care unit (ICU) capable of treating more than 1,500 critically ill patients annually. The Department also has a strong clinical research programme, which since 1990 has led and participated in many collaborative cross-disciplinary and international clinical research projects.

Preclinical research in conjunction with an active PhD programme has further been developed over the past decade.



# DEPARTMENT OF ANAESTHESIA AND INTENSIVE CARE

## Regional Anaesthesia

We have established ourselves as a centre of excellence for ultrasound guided regional anaesthesia in both adults and children. In our research, we have defined the sonoanatomy of the spine and described real-time ultrasound guidance for central neuraxial blocks (epidural injections). We are also internationally recognised for our pioneering work on thoracic paravertebral blockade and its use in anaesthesia and analgesia during major breast cancer surgery for reducing chronic pain and for improving health related to quality of life after major breast cancer surgery. We have also developed many novel techniques for delivering peripheral nerve blockade. Our research work is regularly published in high impact journals, and we have participated as authors and co-editors of reference textbooks on regional anaesthesia. Since 2009, we have hosted the annual International Symposium on Spine and Paravertebral Sonography for Anaesthesia and Pain Medicine (ISSPS), now considered to be the premier event on the subject with attendance by anaesthesiologists and pain physicians from across the globe.

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## Autophagy

Autophagy is a lysosome-dependent catabolic pathway for degradation of proteins, damaged organelles, and intracellular microbes. Dysregulation of autophagy, therefore, has important consequences and is associated with a wide spectrum of diseases, including neurodegeneration, infection and cancer. We were among the first to demonstrate the crosstalk between autophagy and the ubiquitin-proteasome system, its relationship with caspase-independent apoptosis, and its regulation by hydrogen sulphide and hepatitis B virus protein X. Results from recent studies also show that autophagy is dysregulated in *Helicobacter pylori* and *Clostridium difficile* infections. Our future direction in autophagy research includes delineating its roles in different diseases (e.g. sepsis, gastrointestinal cancers) and its interactions with other intracellular signalling pathways.

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“ We are a young yet dynamic department that has made great strides over the last decade. Our achievements in providing education of international renown and ever-increasing research excellence are focused on continuously improving health delivery in our society. We look forward confidently to even greater achievements by our young team in the next 10 years. ”

**Gavin M JOYNT**

Chairman



## Perioperative Complications

Recent advances in medicine have made it possible for more patients with advanced cancer to undergo complex surgery. Despite the benefits of modern medicine, up to 10% of patients suffer post-operative complications such as heart attacks, infection, stroke and cognitive impairment. In collaboration with our global partners, our group has conducted several large clinical trials on various methods, including the use of aspirin, beta-blockers, electroencephalography (EEG) and cardiac troponin monitoring, to predict and prevent these complications. The findings from the trials have been published in major medical journals, including the *New England Journal of Medicine*, *The Lancet* and the *Journal of the American Medical Association*. What's more, these results have been adopted in the latest international practice guidelines for safe and effective surgery.

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## Persistent Pain After Surgery

It is commonly believed that postoperative pain is abolished as wound healing is completed with a return of function. However, our research has found that up to 10% to 20% of patients continue to suffer persistent pain over the surgical wound for months or even years after surgery. We have identified, for the first time, a genetic variant in the brain-derived neurotrophic factor gene associated with the development of persistent pain after surgery. Our group is currently conducting laboratory research as well as a large clinical trial to delineate the mechanisms and strategies to identify and prevent persistent pain after surgery.

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## Intensive Care Research

Infectious diseases and sepsis remain a major cause of morbidity and mortality internationally. The Department's extensive research focuses on the prevention of disease transmission as well as antibiotic pharmacokinetics and pharmacodynamics in critically ill patients. In addition to the numerous pharmacokinetic studies conducted, we have participated in several multinational population studies evaluating sepsis, disease transmission and antibiotic dosing, including MOSAICS, EPIC II and BLING. Department members play a central role in the international Asian Critical Care Clinical Trials Group. They are also on the steering committees of regional and international multi-centre trials examining the practice of mechanical ventilation, the optimal use of intensive care resources and ethics, including the WELPICUS and ACME studies.

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## Intensive Care Education

Our short courses in acute and intensive care for doctors and nurses have been taught in over 75 countries, with over 350 of these courses held internationally every year. In recent years, we have expanded our educational efforts to the teaching of acute care in low resource settings in collaboration with Médecins Sans Frontières. The Department has a proven track record in educational development, such as pioneering the use of a flipped classroom approach, smartphone applications and computer games to teach critical care to undergraduates. In addition to our international reputation for developing and providing excellent educational courses, we have published several pedagogical studies.

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