**Minutes of the Derby Medical Society, Tuesday 18th November 2025**
**Derby Medical School Lecture Theatre**

**Human Factors and Performance-Lessons from the Aerospace industry**
*Dr Sriram Nadathur MBBS(Hons) FRCEM MSc(SEM) GDAvMed GCClinInst*

**Apologies:** None Received

Professor Judd welcomed everyone to this the third meeting of the season. Minutes of the previous two meetings were read by Dr John McIntyre.

Professor Judd introduced the speaker Dr Sriram Nadathur, a Consultant Emergency Medicine Physician at the Royal Derby Hospital. He has trained and worked in both the UK and Australia and developed interests not only in emergency medicine but also in aviation and sports medicine, pre-hospital care and retrieval, medical education and high-fidelity simulation. He also is passionate about cricket.

Dr Nadathur introduced his talk by reminding everyone that Sir Frank Whittle was central to the development of the jet engine here in Derby. The Gloster Meteor became the first British jet engine fighter. Derby is the proud home of Rolls Royce Aerospace where there has been rapid development from first jet engines to the Trent engines that continue to power many modern airliners. Dr Nadathur used an aeroplane model to explain some of the common terms used such as yaw, roll and pitch. He has developed an interest in space medicine and explained the terms of sub orbital and orbital flights. In sub orbital flight the trajectory is a parabolic curve which reaches the Karman line. However, flights with sufficient velocity can go beyond this to reach orbit. There has been remarkable progress the last 120 years or so from the first powered flight of the Kitty Hawk developed by the Wright brothers through to breaking the sound barrier in 1947, the pioneering space flight of Yuri Gagarin and then the first moon walk by Neil Armstrong in 1969.

Dr Nadathur showed how improvements have been made in aviation so that it is now one of the safest forms of travel. A lot of the learning results from improvements relating to human factors, the interaction between systems, the environment and technology. Both aviation and healthcare involve high-risk, high-stakes environments with complex systems where human performance directly impacts safety. The approach to learning from accidents and near misses in aviation with a strong emphasis on safety culture is clearly relevant to the NHS.

Dr Nadathur used well known examples of plane crashes to illustrate the relevance of human factors: the Kegworth air disaster involving a Boeing 737 and the 1977 disaster in Tenerife between Pan Am and KLM Boeing 747 aircraft. Common to both these incidents were human factors and errors aligning in what is termed the ‘swiss cheese model’. A review of what happened at Kegworth highlighted how a series of errors that aligned (‘swiss cheese model’) resulted in catastrophe. A broken left engine fan blade caused a fire and led to smoke in the cockpit. The pilots mistakenly assumed it was a faulty right engine (as earlier models of the 737 jets had ventilation from the right engine) and incorrectly shut the good engine leading the aircraft to crash. Of 118 passengers and 8 crew there were 47 fatalities and 74 serious injuries amongst the survivors. It also became clear from the crash investigation, both cabin crew and passengers could have confirmed with the pilots that it was the left engine that was on fire. Because there was no check between pilots and cabin crew/passengers an opportunity was missed to identify the correct engine to shut down.

In 1977 a collision between two planes at the airport in Tenerife became the worst aviation disaster in history with 585 fatalities. Again, a series of errors contributed to a plane taking off and hitting another one still on the runway. The sequence of events here included: foggy weather; overcrowding of an airport due to a terrorist threat elsewhere on the island; use of non-standardised language between the traffic controllers and the pilots.

Dr Nadathur went on to contrast the approaches to critical incidents between the aviation industry and healthcare. The Heinrich triangle ('accident triangle') is often used to demonstrate how untoward incidents can be classified from unsafe acts, through near misses, minor accidents, serious accidents, fatality and addressing lower order problems can reduce more serious events. In aviation an 'open no blame culture' means that all incidents can be addressed openly and learning applied. However, in healthcare, for various reasons, the investigation approach is often more closed and combined with the blame culture this limits learning throughout the whole healthcare system.

Dr Nadathur explained human factors, often central in untoward events, involve interaction of people and technology and this is a complex area. So often what comes to light is the central importance of communication. In healthcare settings, simulation learning can help identify risk reduction opportunities. Common findings to reduce risks include check lists rather than relying on memory, using standardised protocols, avoiding fatigue and excess workload for staff and ensuring cognitive load management. Central to learning from mistakes is a non-punitive reporting system. Confidential sharing will improve safety. Healthcare needs a just culture focussed on learning rather than blame.

Training simulation can give the opportunity to experience situations that in clinical practise would be rare events and opens the way for students and resident doctors to learn in a non-threatening environment and become familiar with human factor framework. Key elements within addressing human factors include situational awareness, improving communication and these can be practised.

Dr Nadathur concluded that the healthcare service can learn a lot from aviation industry to enhance healthcare safety and performance. There must be a focus on teamwork, standardisation, learning culture and system design. Embracing human factors are key to building a resilient, reliable and a healthier safety culture within the service.

There followed a lively interactive question and answer session

51 guests and members signed the register.