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Guest Editorial

Aerospace Medicine in India: The Roots and The Wings

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I am honored to write this Editorial as the Indian Society of Aerospace Medicine (ISAM) holds its 60th Annual Conference this year, which also happens to be the year I turn 60. Our society was founded when the Indian Air Force had fewer than 50 Medical Officers, but the pioneers displayed tremendous foresight in establishing this Journal. Like all things, the beginnings were humble, but with such a strong foundation, it is no wonder that Aerospace Medicine in India has progressed by leaps and bounds. The Journal has creditably been the mirror as well as the show-window for us.

The early days of Aerospace Medicine in the country were marked by ingenuity in the face of hitherto unencountered challenges. The spirit of innovation and research that underpins this speciality perhaps stems from those days. The pioneers focused on applied physiology including hypoxia, acceleration, and thermal physiology, as also brilliant research in the field of mental workload, cognition and performance, applied anthropometry, cockpit ergonomics, and escape systems. The speciality soon created a special place for itself amongst both aircrew and the aircraft industry. Displaying dedication in operational research, specialists have represented the country at Aerospace Medical Association (AsMA) and International Congress of Aviation and Space Medicine (ICASM) conferences regularly since 2002. Podium and poster presentations from members of ISAM have always been appreciated internationally and have done the nation proud. Our ability to successfully organize the ICASM in 1994, 2006, and 2016 has been second to none.

The speciality has evolved with the infrastructure upgradation and crystalized its aeromedical training curriculum; whether it is for Flight Surgeons or Aircrew Indoctrination on Operational Training in Aerospace Medicine (OPTRAM). It is not a mere coincidence that the sharp decline in accident rate in the IAF has happened ever since DISO training and OPTRAM courses have commenced at IAM and AMTCs. The speciality can justly claim part of the credit for this turnaround. We must of course thank Dr. APJ Abdul Kalam for pitching strongly to investing in aeromedical simulators in the Committee on Fighter Aircraft Accidents. IAM felt proud to receive the President's Colours from this great visionary in 2005, the year DISO training had just commenced.

Our involvement with the Human Space Program in the 1980s was taken to the next level that was further advanced with the signing of IAM-ISRO MoU in 2009. These initiatives paid rich dividends recently, when ISRO wanted aeromedical support to the Gaganyaan Mission and they looked no further than the IAF. This sojourn into space earned our speciality the epithet of "Aerospace Medicine." The domain of space opens up new horizons for the speciality as well as poses new challenges, more of which I would like to highlight later.

The path ahead is arduous, yet exciting. While there is an increasing operational requirement due to the evolving role of the Air Force and its aerial platforms, the onus of taking the speciality

forwards also rests on the shoulders of the young and upcoming specialists of the future. As the nation seeks to establish its geo-political influence, innovative ways to utilize the Air Force assets are being developed. This is creating newer challenges which push the boundaries of current knowledge in Aerospace Medicine. Rapid induction of troops in high altitude areas poses a challenge of rapid altitude acclimatization. The harsh environments of the country's northern borders pose new challenges in ejection and survival. Fatigue has been the major contributor to aviation accidents worldwide, both military and civil. While this is well established, detection of fatigue among aircrew employing simple, non-invasive, and rapid pre-flight screening methods remains a challenge. There remains numerous questions as yet unanswered and operationally relevant research into many of these areas would continue in future.

The IAF hierarchy has recognized the need to give a fillip to the speciality by espousing the revival of the Pilot-Physician programme. A doctor who is also an aircrew is not a novel concept; but reviving this once again in the IAF is exactly the "shot in the arm" that India's operational Aerospace Medicine needs today. Understanding and highlighting various aeromedical issues in aircraft are best done by someone who straddles both these worlds. This endeavor is likely to open up new avenues of operational aeromedical research where "field based" rather than institutional problem solving will be the order of the day.

The cramped fighter cockpit led us into the field of anthropometry and ergonomics where our contribution towards the LCA or Hawk Mk 132 integration with the Indian anthropometric requirements has been substantial and well appreciated. We also forayed into the helicopter, transport, and the AWACS ergonomics. The future battles of human factors, however, will be fought in the cognitive and mental workload arenas. In this increasingly digital world immersed in Internet of Things (IOT), data are the new gold. Embedded hardware in every aspect of aviation with increasingly complex software controlling every aspect of flying, the aeromedical domain cannot afford to lag behind. Soon we will have data at our finger tips. The question would then be how to effectively utilize these data to further strengthen Aerospace Safety. Converting these data into usable information is where the world of Data Analytics, Machine Learning, and Artificial Intelligence is heading to at a breakneck speed. We have no choice but to get on the bandwagon and the time is now. Medical Data Analytics and Smart Algorithms that look for patterns beyond the human eye must be mainstreamed into Aerospace Medicine.

Space is the future. With the Nation's Gaganyaan Programme, we are once again at the threshold of such a quantum leap. The Human Spaceflight Program opens up a completely new horizon for the speciality of Aerospace Medicine. Decades of laboratory-based research on physiological changes in simulated microgravity have suddenly found practical application. ISRO today expects answers in Space Medicine from us because we are the only ones in the entire country who either have those answers or can look for them. While aviation has brought us this far, it is Space that will indisputably and indelibly place the Indian Aeromedical Community on the global map. As with anything in its infancy, it is difficult to see the immediate benefits of nurturing a fledgeling field; however, without this initial nurturing, no field is likely to thrive. And yet being only the fourth country to have its own Human Space Program, the dividends will be rich and quick to come by. We as a speciality will have to contribute not only in selection and training of Gaganauts; but in multiple dimensions of the space mission that is centered around the human being.

In most fields of medicine, diseases and their manifestations change but slowly if at all. It is the diagnostic and treatment modalities that are constantly evolving. Aerospace Medicine is esoteric in the sense that the very reason for its existence, the aerial platform, has the inconvenient habit of completely changing every couple of decades. It is probably this very reason that research and innovation have always been a key focus area in Aerospace Medicine. This spirit of innovation and operational problem solving is as vibrant in the flying bases as it is in IAM or the AMTCs. While quantum leaps will be few and far between, regular, consistent, small, and sometimes ordinary and mundane steps by each one of us will be what matters the most for our speciality to grow.

In the days to come, may the young specialists further our spirit of inquisitiveness and curiosity. May collaborative research in space and human factors yield path-breaking revelations and may the Indian Journal of Aerospace Medicine be the bulwark that stimulates and energizes all members of our society to excel and one that not just interests, but inspires all readers. May Aerospace Medicine continue to soar – To Greater Heights!

Nabhasi Arogyam!

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