

Speech delivered by Dr. SVSharma, Deputy Director, ISAC to a Congregation of Anesthetists at Bangalore on 14th September, 2013

Ladies and Gentleman, A very good Morning to you all.

Having been invited as Chief Guest to address a gathering of Anesthetists who are medical experts dealing with valuable human lives, I was wondering what should I be as a space technologist talk about. The thought that all branches of science converge into a single point and at the highest level science, religion or art has the ultimate aim of enriching human life gave me great comfort. Some loud thinking and I could fathom that at the gross level one could draw a parallel between space technology and Anesthesia.

The Indian Space Programme started very modestly on November 21, 1963 with Dr. Vikram Sarabhai, the founding father of Indian Space Programme enunciating in no uncertain terms, the vision statement as follows:

“There are some who questions the relevance of space activities in a developing nation. To us, there is no ambiguity of purpose, but we are convinced that if we are to play a meaningful role nationally, and in the comity of nations, we must be second to none in the application of advanced technologies to the real problems of man and society which we find in our country. And we should not confuse that the application of sophisticated technologies and methods of analysis to our problems is not to be confused with embarking on grandiose scheme, whose primary impact is for show rather than for progress measured in hard social and economic terms.”

And after half a century of space research in the country this continuous to be the fundamental tenet around which the Indian Space Programme revolves. To the extent that anesthesia is a precursor to any surgery, major or minor, the basic aim of which is to reduce human suffering, here is a parallel between space technology and anesthesia - Both aim at increasing the comfort level of human beings by reducing suffering and burden.

The second parallel is a fact that inspite of research and accumulation of a wealth of knowledge over the years, both Space technology and anesthesia science still find that there remains a lot to be understood and explored. As new vistas of space technology and its applications open up day after day, I am sure new and new anesthetic agents, methods of administering to the patients are emerging. Just as how the subject of space science and technology needs to be fully understand, the varying effects of anesthesia as the human body is a topic for further research.

The behavior of systems, materials and components is the extreme conditions of space do not lend themselves to a blanket one time solution in space. The problems faced and solution expected vary from one to another as in case of a problem faced by an anesthesia is administering the right dosage of anesthetic agent to different patients of different mental and bodily condition.

Both space technologists and the anesthesia tread on a risky plane. While operating in highly hostile environment we have to work on unattended platforms with practically no physical access, anesthetists work on an unenviable, fragile and afflicted human bodies under extreme stress and unfriendly environment. With increasing medico-legal issues coming up to the fore, social pressures on anesthetists are increasing as in the case with space scientists where the cynics are still questioning the justification and legitimacy of spending money on space projects.

In both the fields and methods of recovery in case of a contingency is very complex and often could lead to colossal losses as a result of which both work on great risky conditions. Where uncertainties are very very high and solution requires a good mix of judiciousness and practical thinking, these risks and unknowns have placed both the disciplines on the cutting edge of ever growing science where lot of developments are in pipeline and there lies a long way strewn with challenges.

The job of an anesthetist can be compared to a space engineer working on a prelaunch operations. Just as how an anesthesia prepares conditions for successful and pain free surgery the prelaunch operation of a spacecraft/rocket, check every minute details of their systems to ensure a smooth and trouble free launch.

Rocket science is often referred to in our social parlance with high-tech sense. Both space science or rocket science and anesthetists jobs require a high degree of skill, competence and professionalism.

In both the jobs the critical issue is 'safety'. While a space disaster can cause deaths and miseries if not to speak of the heavy financial losses, anesthesia when not administered properly could lead to loss of precious human beings. Hence it is necessary that skill, competence and professionalism is complemented with adequate instrumentations, systems engineering and operating procedures.

The anxieties and worries of a patients and his well wisher can be compared to the anxiety of the launch team where after months of check – re-checks and final checks, thousands and thousands of interfaces have to complement one another and work as a single systems in unison.

At the system level, I understand there are around 30 steps in administering anesthesia, review of history, consent of the surgeon, blood product planning, identifying special plans, equipment preparations, drug propagation, induce anesthesia, muscle relaxation, ventilating the patient, arranging care etc to name a few. Like all sciences, Space technology too is a step by step process. We start with the mission definition followed by their iteration taking into account the user needs. Once the mission is defined the technologies that are essential to meet them are identified and reviewed. Systems designing, fabrication, integration, testing and implementing of tests results, prelaunch review, mission readiness reviews, etc. wherein each of the component, material, subsystem, system is tested at every level of its preparation. These tests are done in ambient conditions. To qualify them for extreme space conditions tests like thermo – vacuum, vibration, acoustic tests etc are done before the spacecraft is finally accepted. The problems faced in the engineering model are thoroughly reviewed and the solutions are implemented in the Flight Model which again goes through most of the above said stages.

So much to say about the striking similarities between the two branches of science which at the outset are vastly different.

My address to you would not be complete without a reference to the achievements of the medical and space fraternity in India. The Government spending on health care and space despite being abysmally low, the heights two sectors are achieved can be something to be proud of.

Indian Space efforts have paved the way for a number of thematic applications of utility to the common man through its remote sensing satellites like water targeting, crop health estimation, crop acreage estimation, forest mapping urban studies, mineral targeting, environmental pollution monitoring and control etc, if not to speak of more exotic themes. Besides the communication and meteorological satellites have established a network of around 11 live spacecraft serving utility sectors like TV broadcasting where in nearly 90% of population is covered, radio networking, distance education, telephony etc.

As doctors one application of INSAT system that would be of interest to you is the “Telemedicine project” where in remotely located clinics and hospitals when adequately equipped can be connected by audio and video with the major hospitals with specialist’s doctors. This has obviated the need to travel wide distance for specialist consultation while at the same time providing instantaneous specialist advice to patients located at remote areas.

Despite poor spending health care, medical tourism to India has caught up and a number of patients with chronic diseases are travel to India for treatment at a cost which is much lower than what it would have been otherwise in more developed countries. Advanced medical attention for devastating cardio vascular ailments which were far and few in India about 10 and 15 years back are today available in almost all major cities at reasonable / affordable cost. This is the silent revolution our medical fraternity has brought about.

I hope, I have been able to engage your attention on some of features of space technology that I am adept at vis– a vis your specialized job of anesthetists. As experts working on cutting edge of technologies our systems approach, risks, anxiety, unknowns, uncertainties, professionalisms remain the same.

Thank you for your Attention