

# International pathways for aerospace medicine education, training, and accreditation – where to from here?



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International Space Surgery Research Consortium

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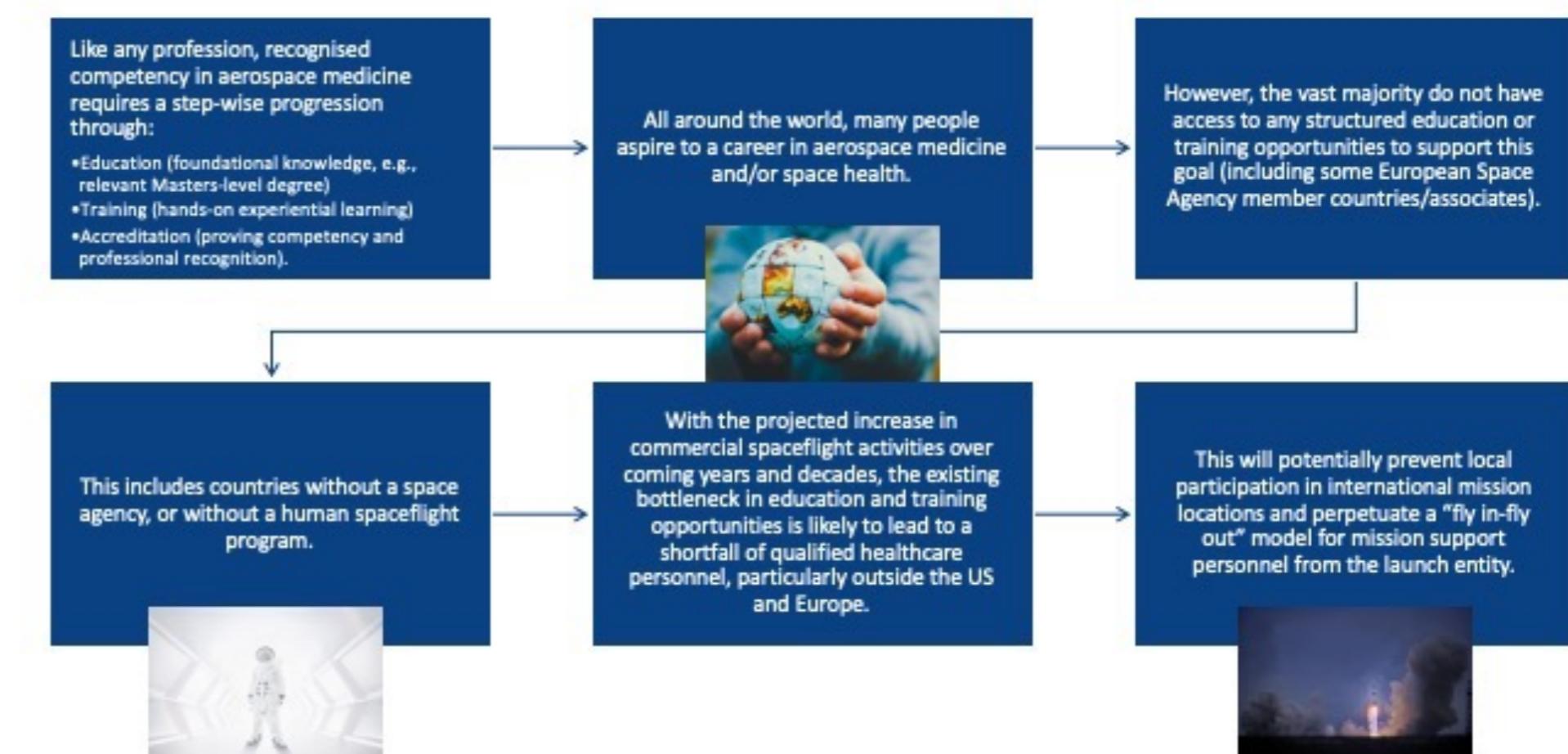


## What is aerospace medicine?

- Aerospace medicine focuses on:
  - Clinical care
  - Operational support
  - Research
- Relating to the health, safety, and performance of:
  - Crew members, passengers, and support personnel
  - Connected with aviation and human spaceflight.
- Special considerations:
  - Remote, isolated, extreme, or enclosed environments
  - Conditions of physical and psychological stress
  - Technological and life support needs, e.g., changes in air pressure and oxygen availability, increased or decreased gravitational forces, increased radiation exposure, and many other factors.
- As a result, aerospace medicine practitioners require specialised skills and knowledge.



## Pre-requisites for recognised competency



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## Post-graduate medical training

- A common medical training model internationally involves:
  - A first degree, often in the biomedical sciences
  - A post-graduate medical degree (most often a four-year program)
  - Post-graduation internship (usually one year)
  - Subsequent specialist training program (timing varies – often three to seven years)
  - Fellowship for sub-specialisation (often one to three years).

The USA is the only country globally that offers multiple structured and accredited civilian and military aerospace medicine post-graduate training programs and positions, referred to as "residencies", some including access to space health training and experience.

Aerospace medicine residencies are linked to the American Board of Preventive Medicine (ABPM) as the accrediting body.

Accreditation as an aerospace medicine specialist requires the completion of a Master of Public Health or equivalent masters or doctoral degree (five compulsory content areas).

Several new US-based space medicine fellowships have recently been developed for emergency physicians and surgeons/surgical residents (not currently recognised by ABPM).

These differing approaches have caused some tensions within the industry.

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## Aerospace medicine challenges globally

- Globally, there is only a small number of immersive employment-based residences offered by countries other than the US for their citizens, but where there is no human spaceflight support experience available, these programs primarily focus on aviation.
- Regardless of the geographical context, demand for aerospace medicine residencies and fellowships far exceeds supply.
- Significant regulatory barriers exist for international citizens in terms of accessing aerospace medicine education, training, and accreditation.
- For instance, many positions within the European Space Agency (ESA) require applicants to be a citizen of an ESA member country or affiliate.
- Participation by non-US citizens in the US space and defence industries is severely constrained by virtue of regulations such as ITAR (International Traffic in Arms Regulations) and EAR (Export Administration Regulations), as well as professional accreditation requirements.
- Without special arrangements such as exemptions or bilateral agreements, non-US citizens are unable to apply for the most basic stepping stones in aerospace medicine training, such as the NASA space medicine internships and aerospace medicine clerkships.



## Diversity and inclusion challenges

- In addition to questions of access and regulatory barriers, there are also hidden barriers relating to factors such as:
  - Gender, identity, and ethnicity
  - Income levels and access to financial support
  - Language ability
  - Physical ability/disability
  - Cross-border recognition of qualifications
  - Geopolitical factors relating to country of origin, e.g., if under international sanctions.
- Globally, there is currently only one English-language Masters of Aerospace Medicine program that is open to "all comers", at King's College, London, in the UK.
- This is a one-year in-person program that requires the student to move to London, pay all their personal costs in addition to tuition fees, and be able to afford to forego any income they might otherwise have earned.
- The current fees for an international student are approximately A\$80,000 (US\$52,000).
- This is a further example of just how unaffordable and inaccessible conventional approaches to this issue have been.



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## How can we align core competencies?

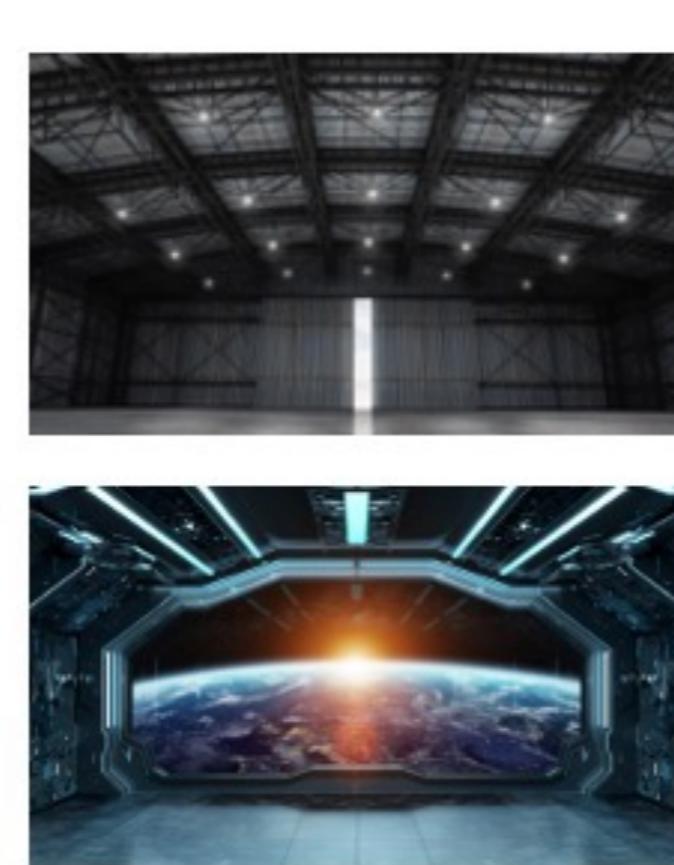
- Collating a core competencies framework for the education and training components based around existing aerospace medicine training programs and published standards would provide a 'rubric' for assessment of competency and granting of industry-recognised accreditation.
- Examples of existing common core competencies include:
  - Clinical expertise and skills in emergency, preventative, and occupational medicine;
  - Knowledge of the aerospace environment and risks;
  - Professional communication and teamwork skills; and
  - Operational skills and knowledge.
- It is envisaged that a wider consultation of leaders from aerospace and space medicine, and aerospace engineering and design, could provide useful inputs towards developing an international aerospace medicine core competencies framework that will best equip health professionals to meet future needs in a manner that is recognised by industry.
- Components of this program could also be utilised for cross-disciplinary education and outreach to inform members of the design and engineering disciplines about the challenges involved with maintaining good human health and wellbeing in the space environment.

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## A possible solution

- Thus, there is a strong imperative to develop an integrated aerospace medicine and space health education and training program that will:
  - Be accessible and affordable for all aspirants regardless of geographical location or citizenship;
  - Provide a combination of formal academic education and practical training opportunities in aerospace medicine and space health;
  - Result in transferable credentials that can be recognised both industry-wide and internationally;
  - Provide an acceptable level of credentialling for international health professionals to be accepted as part of the support teams for human spaceflight activities being conducted in their home country, or to participate professionally in aerospace medicine activities generally; and
  - Provide foundational credentials that can be accepted as a basis for further workplace-based training and experience to advance to recognised 'specialist' or 'expert' status.
- It is worth noting that it is not only both specialist and non-specialist doctors who suffer from lack of opportunities to train in aerospace medicine, but also most other healthcare professions that are involved in supporting aviation and human spaceflight.
- Such a program should be inclusive of all relevant healthcare professions – "leave no-one behind".



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## We need your help!

- To summarise, previous advocacy efforts have suggested a globally accessible, affordable, and inclusive aerospace medicine education, training, and accreditation program that includes:
  - a common foundational education component, e.g., a step-wise aerospace medicine Certificate/Diploma/Masters degree program that allows specialisation in space or aviation or both;
  - structured "hands-on" experiential training that results in acquisition of agreed skills and competencies (based around existing models); and
  - at the conclusion of the program, assessment of competency and accreditation to a common standard that is widely recognised as acceptable for practitioners to be eligible to participate in supporting human spaceflight missions around the world.
- To take the next steps towards making such a program a reality, our international working group needs:
  - Academic institutions and funding entities willing to engage with developing and hosting an internationally accessible and affordable step-wise Certificate/Diploma/Masters program in aerospace medicine
  - Academic institutions or industry partners interested in collaborating on providing accessible and affordable hands-on aerospace training opportunities for international health professionals
  - Feedback from academia and industry as to the most desirable core competencies for health professionals to support future human spaceflight activities.



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