Aeromedical Transport – A Niche for Aerospace Medicine

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The year is rapidly flying by, and I'm running out of "runway" and opportunity to speak to you all via these President Page chats. I have so far outlined the 6-part framework that is Aerospace Medicine (AM).[4] I've waxed eloquently (or not ☺) about Team Aerospace[5] and the unique business that we practice every day. I've pointed out how AM is different from other specialties[8] and how our productivity and effectiveness don't fit nicely into traditional clinical paradigms.[6] And yes, I've even challenged you to "pay it forward" to our AsMA Foundation (which you still have a chance to do!)[7] Now I want to lay out an argument for increased AM participation in an area where we have not exercised demonstrable leadership or even noticeable passing interest in taking on and improving performance of the overall system. What system am I referring to? It's our aeromedical evacuation or AE system. But first, some much needed perspective.

Take a look at the chart (**Fig. 1**). The X axis represents the spectrum of human health. Healthy is white. "Sicker" is more to the right and moves more right with severity (black). It is my contention that all of traditional clinical medicine lives largely along this shifting "health spectrum," and mostly from the center to the far right of the X axis. As individuals move to the right on the line, clinical medicine intervenes directly proportional to the movement rightward. As people get "sick" (moving rightward), medicine applies more resource to reverse the movement and return them back towards the "healthy end" of the axis. Preventive Medicine and Public Health physicians prefer largely to operate on the left side of this axis – making critical interventions to keep individuals and populations from moving towards the "sick" end of the line. Traditional medicine is concerned with abnormal physiology in a largely normal environment; I'll call it "standard temperature and pressure conditions." Effective interventions are measured and compared under standard experimental conditions.

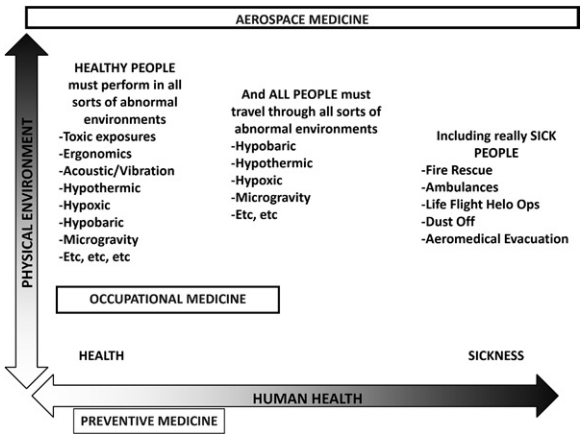

Fig. 1. Spectrum of human health and additional factors.

But as our AM profession has learned and practiced, there are a multitude of other factors that affect human health. In the chart, the Y axis represents these additional factors – such as those environmental exposures that impact overall health of both individuals and populations. Less harsh is low on the axis (white); more disruptive conditions move up the axis towards the black. Occupational Medicine (OM) is largely concerned with these factors in the working population of generally healthy individuals. The term "healthy worker effect" was coined by McMichael, who observed that actively employed folks have lower mortality than the population at large.[3] Thus, OM largely deals with the left side of the chart area – healthy people under various occupational conditions. AM's traditional OM functions include selection, risk reduction, and care of aerospace workers, pilots, astronauts, air traffic controllers, maintainers, etc., including return to duty or "work" limitations. This gives rise to the familiar AM definition of "normal physiology in an abnormal environment." This could easily apply to military medicine that supports operations of "healthy troops" in unusual or harsh environmental conditions (deployment, combat, heat, cold, etc.).

Some argue that AM is a subset of OM. Pshaw! I contend that AM is broader, encompassing issues across the entire 2-dimensional spectrum of medicine depicted in the chart. For example, due to the ever-increasing access to air travel, AM is concerned with those moderately ill individuals who enter the altered environmental conditions of an aircraft at altitude, or with the dawn of civilian commercial space travel, even a spacecraft – passenger health. Those stable, moderately ill individuals may respond quite differently to these altered conditions than healthy passengers. This begins to blur the lines of that traditional AM definition to "not-so-entirely-normal physiology in the abnormal environment." Most clinicians remain woefully underprepared to advise or even discuss these potential impacts with their traveling patients. But AM is prepared to do so. This is clearly the center of the chart.

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But many of the areas that AM practitioners must be familiar with occur on the far right of the area chart. Circumstances found inside of the aviation environment often involve severe injury or illness and aeromedical transport of these very ill individuals. Accident response, air ambulance transport, and long-haul aeromedical evacuation (AE) to name a few. This area could use more than just the current passing involvement of AM. Air ambulance helicopter transport is an area where AsMA has had some impact with recent helicopter safety resolutions and advocacy. But I'd like to specifically focus on long-haul AE.

Historically, AE developed based on an in-patient, ward model, moving only stable patients, and it largely remains so today. In Operation Just Cause in 1989, the U.S. Air Force first moved critically ill but "stabilized" patients. In the following decade, the entire U.S. medical system underwent a paradigm shift away from ward-based hospitals and open surgeries to outpatient-based clinics and laparoscopic surgical procedures. Seemingly overnight, low acuity hospital wards became a thing of the past, replaced by higher acuity overnight patients, leaving only Intensive Care (ICU) and step-down units. This shift was disruptive to both medicine and nursing care. But this fundamental reorganization of care has not extended to AE crew make up.

Current AE remains driven by a relatively inflexible, overly regulated system that uses opportune aircraft with standard, "ward-based" crews of flight nurses and medical technicians. The low acuity ward model of prescribed physician orders anticipating probable medical situations no longer suffices, for hospitals nor the new higher acuity AE system. Patient movement centers (PMCs) attempt to "regulate" all AE patients and ensure appropriate medical directives accompany each patient. But to fly stabilized patients (of ICU or step-down acuity inherently not medically stable), the AE system needs higher acuity medical, respiratory and nursing care. The U.S. Air Force's answer of Critical Care Air Transport Teams, or CCATTs, addressed these acute needs with specially trained, self-contained, physician-led, flexible, responsive, and autonomous medical care during the transport phase. But CCATTs can't be everywhere. This model relies on low density, highly specialized resources with time-sensitive skills that quickly perish under times of low mission volume. The opportune aircraft model complicates the staging and use of current medical crew and especially CCATTs. The current patient regulation regime cannot anticipate all the inflight medical issues for "stabilized" patients prior to takeoff, nor can the present medical force structure sustain the numbers of CCATTs that an opportune, "stabilized" patient, AE system needs.

Patient Centered Medical Home principles advocate physician-led, team-based care as the foundation of trusted care.[1] The American Medical Association argues, "The most effective way to maximize the complementary skill sets of all health care professionals is to work as part of physician-led teams… providing the safest, best possible care to patients."[2]

Taking notice of these trends in medicine and operational realities, the U.S. Air Force should increase the capability of the basic AE crew by adding a physician to the normal crew complement. Clearly, trained AM specialists or flight surgeons are the logical candidates. Having more physicians as crew within the AE system would increase the flexibility and autonomy of the standard AE mission by reducing the reliance on preflight regulation of patients in favor of autonomous medical decision making. It would give flight nurses ready access to physician orders without communication back to a remote, constrained PMC. Moving patients with standard physician crew from role 1 or 2 to role 3 or 4 assets could be done without lowering level of care during transfer. CCATTs could still be used on high acuity missions but the standard AE crew would be able to manage many medium to higher level acuity patients without prestaging CCATTs. It would expose more physicians to challenging environments and AM principles that could improve recruitment and retention of physicians to AM and potentially improve job satisfaction by reducing burnout. If you tapped into the global telecommunications network while inflight, then telemedicine capabilities could fully augment a basic crew during very high acuity transports. All of these possibilities would lead to a significant improvement and paradigm shift in the capability of the overall AE system while bringing the system into better alignment with the current state of medical care and practice.

Civilian care innovations portend the next iteration of healthcare, leveraging physician-led care teams, cutting edge technologies, and telemedicine capabilities to extend sophisticated care to areas that have not otherwise sustained these high value resources. Of course, doctrine, operational training, and manpower would have to shift to support such a change. But by placing AM trained physicians (or flight surgeons) onto basic AE crews aboard all AE missions, the U.S. Air Force could maximize the autonomy and flexibility of the AE system within the likely constraints of future operational medical force structures while observing trusted care principles, raising the level of care available to those in need of AE. In the end, there would be more flight surgeons out there to support those doing the mission and to…

… Keep all of 'em flying.

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