

Divergence of military and civilian trauma
research prioritiesDavid Baer,^{1,2} Ross Donaldson,^{2,3,4} Todd McKinley,^{2,5} Robert Guldberg^{2,6}¹Prytime Medical Devices,
Boerne, Texas, USA²Coalition for the Advancement
of Research and Innovation in
Trauma, Washington, DC, USA³Critical Innovations, Inglewood,
California, USA⁴Department of Emergency
Medicine, UCLA Schools of
Medicine and Public Health, Los
Angeles, California, USA⁵Department of Orthopedic
Surgery, Indiana University
School of Medicine,
Indianapolis, Indiana, USA⁶Phil and Penny Knight Campus
for Accelerating Scientific
Impact, University of Oregon,
Eugene, Oregon, USA**Correspondence to**Dr David Baer; dbaer@
prytime.comReceived 11 May 2021
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While overall trauma research and development funding has a long history of being woefully underfunded in comparison to its societal impact, one saving grace has been the longstanding synergy between military and civilian activities. The crucible of war and caring for those injured in combat has driven innovation in every area of trauma care, with numerous recent examples from Afghanistan and Iraq alone.¹ From large-scale innovations such as medical evacuation, to individual devices such as hemostatic dressings, high-impact research, development and innovation has been spurred by military medical necessity, investment and use. This is captured in the adage that the only winner in war is medicine. Military innovations in trauma have spread widely to the civilian arena, where they are more carefully studied and further refined. While it is tempting to examine military medical innovation in the isolated context of military use, the beneficial back and forth between military and civilian trauma care is an essential, not optional, step to ensure maximum benefit to military casualties.² The overlap between civilian and military trauma care and innovation has thus been of mutually reinforcing benefit.

Many journals and publications have consistently and correctly identified the need for a civilian counterpart to the military's investment in trauma care. Most recently articulated by Glass *et al*,³ the National Institutes of Health (NIH) has failed to fund this vital research area at levels matching the problem's scope, which in turn costs untold deaths and disability. Unfortunately, this problem is on the precipice of suddenly worsening, as highlighted by a recent panel discussion between the director of military trauma research and the civilian NIH Office of Emergency Care Research. These leaders presented a growing disconnect between the agendas of these two main funding organizations, as the military adjusts to future combat threats and leaves a void in traditional trauma research that the NIH lacks the current resources to fill.

Given changes in national strategic focus, the US military has recently adapted its trauma research and development activities towards future battlefield challenges that are envisioned to be unlike current or recent wars. This future is termed the multi-domain battlefield (MDO).⁴ As articulated by CDR (Dr) Travis M Polk at a recent panel meeting hosted by Indiana University, the military medical establishment has risen to this challenge by investing its combat casualty care equity to enable extended (eg, 24-hour-plus) casualty stabilization at or near the point of injury. Under development during several

years, this concept has been the growing focus of the military's trauma research requests for the last several grant cycles and, as Dr Polk's presentation made clear, will continue to be the funding focus for the foreseeable future.

The military's focus on its key strategic initiative is appropriate. However, the lack of a cohesive civilian strategy and investment portfolio for trauma innovation means the military's change has the unintended consequence of leaving the civilian trauma challenge with an even larger gap, and without a plan or resources required to address the terrific toll of traumatic injury. In recent years, the military trauma research investment has been diminutive (compared with spending on other medical challenges), despite constituting the lion's share of the funding in this domain, estimated at over 80% of the total.⁵ While the NIH's expenditures in trauma research are an important supplement to this investment, it fails to come close to matching the scope of this problem.

Another symptom of the shift in military funding priorities is the reduction of military investment in trauma innovations addressing the longer term impacts of injury. During the past 10–20 years, the military has made significant investments in functional recovery for injured warfighters, and just as the innovations in acute trauma interventions have benefitted civilian trauma patients, these innovations are inherently dual use. This investment has resulted in important innovations in amputee rehabilitation, improvements in prosthetic devices, burn scar treatments, traumatic brain injury rehabilitation, wound management, and wound infection prevention and treatment among many others. Yet this focus on longer term impacts of injury has similarly shifted, as evidenced by the military deactivating the Joint Program Committee for Clinical and Rehabilitative Medicine, which had been responsible for planning and coordinating the funding of research in these areas. Just as with acute trauma care, responsibility for funding for these topics in the NIH is distributed and minimal compared with the scope of the impact to health.

Today we stand at a crossroads, where military and civilian trauma research investment has left significant gaps in the resources required to reduce mortality and morbidity from traumatic injury. As has been repeatedly discussed at the podium at the American Association for the Surgery of Trauma conference and a recent National Academy of Medicine report,⁶ the lack of appropriate national focus has left both civilian and military trauma patients without needed devices, drugs, biologics

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and treatment method innovations to reduce preventable number of deaths and disability. Recent changes in military mission planning and investment are now further mortgaging the future of civilian trauma innovation and highlight a massive risk in assigning the majority of the responsibility for funding of research in this area to the military. While the military investment in this area is appropriately prioritized to its specific challenges, this leaves a growing resource vacuum that needs to be addressed by the appropriate civilian funding agencies (eg, NIH, Biomedical Advanced Research and Development Authority) to enhance health, lengthen life and reduce the burdens of illness and disability. A cohesive civilian approach to trauma research and development will benefit all Americans and allow US military leaders to focus their efforts on the future battlefield.

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