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SURGERY IN LOW AND MIDDLE INCOME COUNTRIES

# Global Survey of Demand-Side Factors and Incentives that Influence Advanced Trauma Life Support (ATLS) Promulgation

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## Abstract

*Background* We aimed to identify and describe demand-side factors that have been used to support ATLS global promulgation, as well as current gaps in demand-side incentives.

*Methods* We performed a cross-sectional survey about demand-side factors that influence the uptake and promulgation of ATLS and other trauma-related CME courses. The survey was sent to each of the four global ATLS region chiefs and 80 ATLS country directors. Responses were described and qualitative data were analyzed using a content analysis framework.

*Results* Representatives from 30 countries and each region chief responded to the survey (40% response rate). Twenty of 30 country directors (66%) reported that there were some form of ATLS verification requirements. ATLS completion, not current verification, was often the benchmark. Individual healthcare systems were the most common agency to require ATLS verification (37% of countries) followed by medical/surgical accreditation boards (33%), governments (23%), training programs (27%), and professional societies (17%). Multiple credentialing frameworks were reported including making ATLS verification a requirement for: emergency unit or trauma center designation (40%), contract renewal or promotion (37%); professional licensing (37%); training program graduation (37%); and increases in remuneration (3%). Unique demand-side incentives were reported including expansion of ATLS to non-physician cadre credentialing and use of subsidies.

*Conclusion* ATLS region chiefs and country directors reported a variety of demand-side incentives that may facilitate the promulgation of ATLS. Actionable steps include: (i) shift incentivization from ATLS course completion to maintenance of verification; (ii) develop an incentive toolkit of best practices to support implementation; and (iii) engage leadership stakeholders to use demand-side incentives to improve the training and capabilities of the providers they oversee to care for the injured.

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## Introduction

Continuing medical education (CME) courses, such as Advanced Trauma Life Support (ATLS), are important components of health systems and drivers of quality improvement [1]. ATLS was developed in 1978 by Dr. James Styner, an orthopedic surgeon, who lost his wife as a result poorly organized trauma care after a plane crash [2]. The course was designed to establish a common language and system to care of the injured. In 1980, the American College of Surgeons (ACS) Committee on Trauma (COT) adopted ATLS and has made continuous improvements on its contents and delivery [3]. ATLS is now taught in more than 80 countries and has trained more than 1 million physicians [4].

Despite the relative success of ATLS promulgation globally, there are significant swaths of the world where ATLS is rarely or not available (Fig. 1) [5]. A study of four low- and middle-income countries (LMICs) showed that less than half of doctors providing trauma care had taken ATLS or other trauma CME courses [6]. LMICs bear disproportionate burdens of injury that could be reduced with more organized trauma care and training [7, 8]. Studies that have examined the impact of ATLS on trauma systems have reported an approximately 20% reduction in early injury-related mortality after its uptake [3, 9, 10]. Given the effectiveness of ATLS and the global applicability of its systematic approach, all providers who care for injured patients should have the opportunity to take ATLS. This goal might be achieved through better leveraging of supply- and demand-side factors and incentives that influence ATLS promulgation.

The numerous factors that drive uptake of CME courses have been detailed [11–13]. Supply-side factors include course availability and geographic access; affordability of course registration, travel and indirect costs; and numbers of local instructors. Efforts are underway by the COT to address supply-side factors by developing models to reduce cost and allow course to be tailored for low-resource environments. Demand-side factors include policies implemented by agencies that incentivize target audiences to register for and take the CME. Promulgation of ATLS globally could be facilitated, if not accelerated, by strategic use of demand-side factors where ATLS is currently unavailable or rarely provided (Box 1). However, demand-side factors that influence ATLS have not been explored or collated in a way that is useful for informing promulgation strategy.

To address this gap, we aimed to identify and describe demand-side factors that have been used to support ATLS promulgation, as well as current gaps in demand-side policies at national and sub-national levels. We hypothesized that demand-side policies could be identified to support the promulgation of ATLS globally.

## Methods

### Survey and respondents

We performed a cross-sectional survey regarding past, current and potential demand-side factors that influence the promulgation of ATLS and other trauma-related CME courses. The survey was co-developed with the ATLS Subcommittee. The survey was sent to each of the four global ATLS region chiefs and the 80 ATLS country directors (Fig. 1). The survey included specific questions regarding demand-side factors that may facilitate promulgation of ATLS, as well as an open-ended prompt to allow respondents to describe demand-side policy successes, challenges, and unique incentive schemes. ATLS Subcommittee circulated the survey via email and a virtual platform; three reminders over six months were used to ensure maximum response rate. Use of data for this publication was considered not to constitute human subjects research by University of Washington Institutional Review Board.

The survey focused primarily on ATLS Student and Student Refresher Courses; however, other ACS and non-ACS trauma courses were also included given that the demand-side factors used to support promulgation of other trauma CME courses would be analogous to those used for ATLS.

### Analysis

Responses were described and qualitative responses were analyzed using a content analysis framework [20]. First, responses were coded by policy, regulation and incentive, as well as target of influence (e.g., providers, hospitals, health systems). Responses with similar policies, regulations, incentives and targets were coded and then collapsed into key demand-side strategies.

## Results

### Respondents and country representation

Each region chief and 30 country directors responded (Fig. 2). Of country directors, 15 were from countries within The World Bank high-income country category (50%), 7 were upper middle-income (23%) and 8 were lower middle-income (27%) (Fig. 3a).

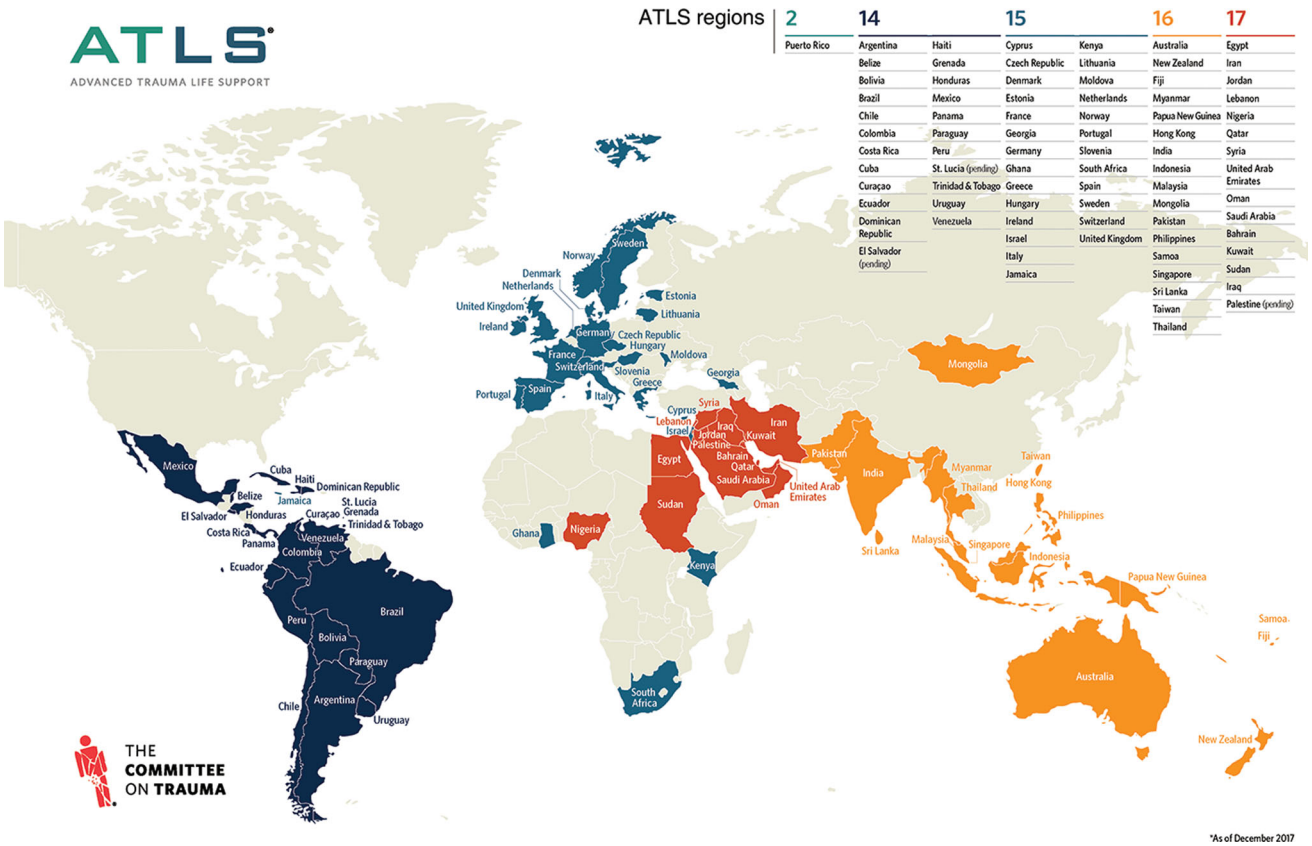


**Fig. 1** Advanced Trauma Life Support (ATLS) global regions and the countries that they represent [figure from American College of Surgeons (ACS) Committee on Trauma (COT) ATLS Subcommittee]

**Box 1** Information about global promulgation of Advanced Trauma Life Support (ATLS)

| Question | Description |
|---|---|
| What is promulgation? | Increased uptake of ATLS within countries with existing ATLS programs, and development of ATLS Programs within requesting countries via a recognized surgical or medical organization or national American College of Surgeons (ACS) Chapter |
| How is the ACS Committee on Trauma (COT) ATLS Subcommittee organized to support promulgation? | The ACS COT ATLS regional committees are organized with 17 Regions worldwide, 4 of which are outside of the US and Canada. These 4 international regions include Latin America, Europe and sub-Saharan Africa, the Middle East, and Australasia and are responsible for supporting ATLS promulgations in their region. Detailed information on ATLS international promulgation can be found on the ACS COT website [41] |
| What are the expectations for organizations and individuals supporting ATLS promulgation? | ATLS is expected to be made available for all physicians within the requesting country who wish to participate regardless of race, creed, sex, color or professional discipline |
| What are the steps of establishing at national ACS ATLS Program? | ACS COT ATLS Subcommittee has provided policies and procedures for requesting, initiating, and conducting an approved ACS ATLS Program. Depending on whether the request is from an ACS Chapter or an outside organization, the steps are similar: 1. Request initiation, 2. Host introductory site visit, 3. Participate in initial training, 4. Maintain inaugural courses, and 5. Continue promulgation within country |

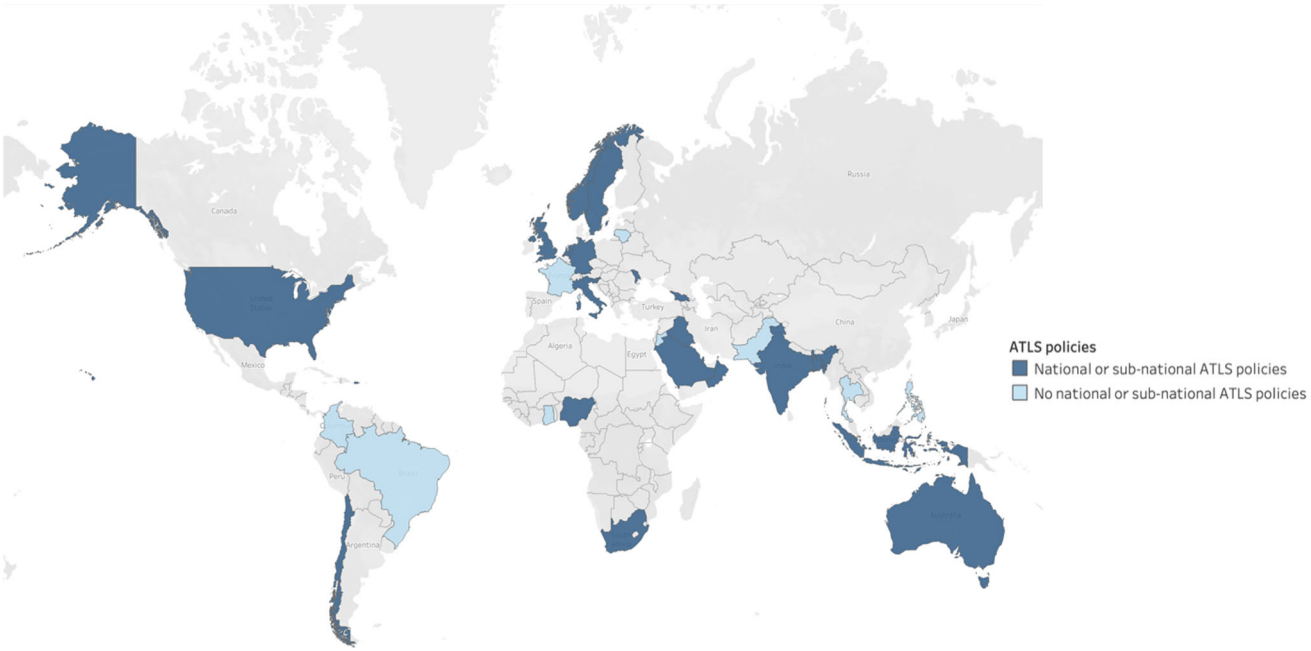


**Fig. 2** Representation of Advanced Trauma Life Support (ATLS) country directors who responded to the survey and the presence of national or sub-national demand-side polices related to ATLS

## Demand-side factors related to ATLS and other trauma-related CME courses

Twenty of 30 country directors (66%) reported that there was some form of national or subnational ATLS verification requirements (87% of high-income countries, 43% of upper middle-income countries, 63% of lower middle-income countries) for credentialing, completion of training, and/or hospital accreditation. Of countries with national or subnational ATLS verification requirements, 45% reported that ATLS verification must be current to be in compliance (four years with an additional six-months grace period prior to refresher course); 55% of countries with national or subnational requirements only expected ATLS to be taken once.

Regardless of national income, individual healthcare systems were the most common agency to require ATLS verification (37% of countries) followed by medical or surgical accreditation boards (33%), national or regional governments (23%), training programs (27%), and professional societies (17%) (Fig. 3b). Eleven countries (37%) reported sporadic hospital-specific requirements for ATLS verification (i.e., providers in trauma centers or who take care of injured patients) without an overarching requirement or accreditation agency. High-income countries more commonly had multiple agencies that required ATLS verification than middle-income countries.

## Accountability and credentialing frameworks

Multiple accountability and credentialing frameworks were reported and included making ATLS verification a requirement for: emergency unit or trauma center designation (40%), contract renewal or promotion (37%); professional licensing (37%), particularly for emergency medicine physicians, surgeons, and physicians who practice in trauma centers or rural communities; medical school, residency or fellowship graduation (37%); and increases in remuneration (3%) (Fig. 4). Private and not-for-profit hospitals were often reported to be exempt from accountability and credentialing frameworks.

## Examples of demand-side policies and incentives

Several unique demand-side incentives were reported. As example, in the absence of specialty-specific courses [e.g., Advanced Trauma Care for Nurses (ATCN), Prehospital Trauma Life Support (PTLS)], Bangladesh has ATLS course completion requirements for non-physicians, including emergency nurses, health technicians and paramedics who can audit the course. Evaluation of content and skill retention, changes in agency or effectiveness of non-physician ATLS student courses in Bangladesh is yet to be performed.

Eleven country directors (38% of country director respondents) who represented all national income levels

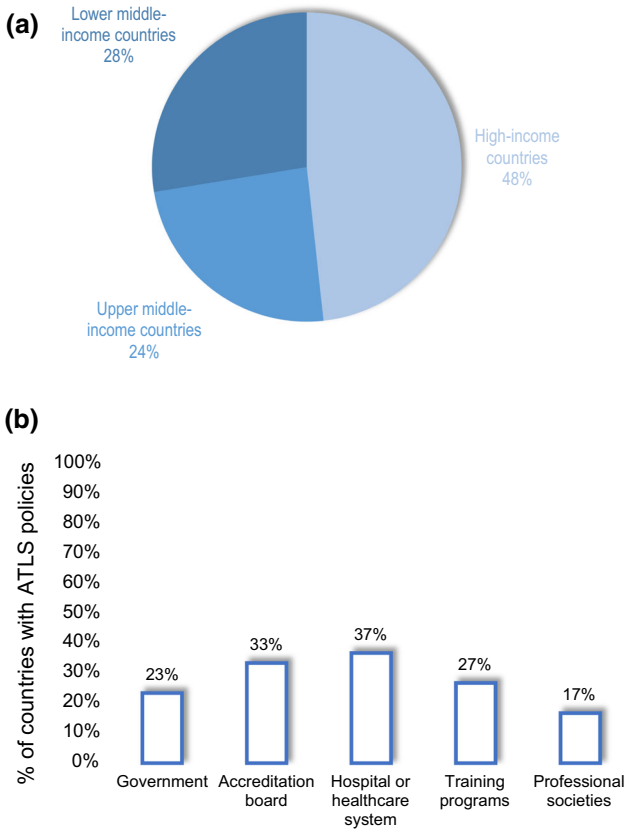


**Fig. 3** **a** Representation of countries by The World Bank national income level. **b** Breakdown of agencies that govern policies related to Advanced Trauma Life Support (ATLS) verification

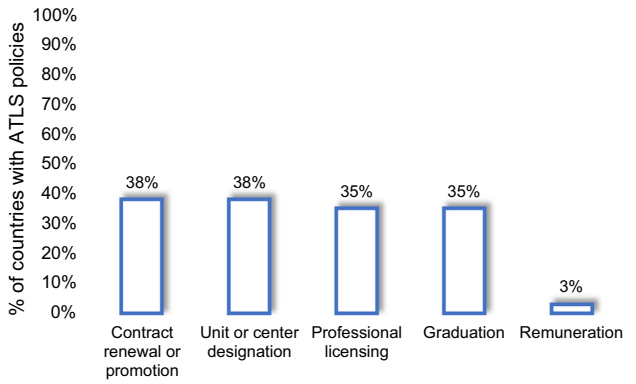


**Fig. 4** Breakdown of accountability frameworks that promote Advanced Trauma Life Support (ATLS) verification

reported national or sub-national government subsidies for the ATLS Student Course: high-income countries—Saudi Arabia, Chile, Oman, Slovenia; upper middle-income—Georgia, Thailand, Jordan, Colombia; and lower middle-income—Pakistan, Bangladesh, Philippines. One lower middle-income country reported that the infrastructure and equipment required for ATLS were subsidized, which lowered the financial burden for providers and promoted registration. Specific information about the impacts of these subsidies were not available.

Another lower middle-income country (South Africa) reported that ALTS courses were coordinated and organized by a non-ACS national professional society with a focus on trauma care. One high-income country (Qatar) reported that ATLS courses were subsidized in order to meet CME requirements needed for accreditation by the Joint Commission International. No country director reported that other ACS or other trauma CME programs had been incentivized.

## Discussion

We identified demand-side factors used to support ATLS promulgation, as well as current opportunities to implement demand-side incentives more strategically. Several factors and opportunities were commonly reported. First, about two-thirds of country directors reported national or sub-national use of demand-side incentives to facilitate uptake of ATLS; however, use of demand-side incentives were less commonly used in middle-income countries despite significant burdens of injury [8]. Importantly, initial ATLS course completion was often incentivized but not necessarily maintenance of ATLS verification despite known decay of knowledge and skills over time [14, 21]. Second, a variety of agencies (e.g., governments, accreditation bodies, professional societies, training programs) utilized the demand-side levers. However, only a minority of countries reported that one of these agency types were involved. These represent missed opportunities to increase training of providers who might care for injured patients. Lastly, innovative demand-side solutions to facilitate ATLS promulgation were reported, including expansion of requirements to non-physicians and use of subsidies. These findings represent evidence for and opportunities to use policies, incentives and other potentially successful demand-side levers to increase the promulgation of ATLS globally.

Injury-related mortality is ten times greater in LMICs than in high-income countries [8, 22]. In addition to injury prevention and control initiatives, systematic development of emergency and trauma care systems is required to achieve meaningful reductions in injury-related death and disability [23]. A key component of emergency and trauma care system development is training and CME. ATLS and other trauma CME courses are critical adjuncts to training initiatives [24]. Given that ATLS is validated in global

contexts and readily implemented with existing materials, lack of demand-side incentives in LMICs represent great opportunities to catalyze trauma care development. Although less expensive trauma CME programs are often supported by national and sub-national entities, these offerings (e.g., symposia, lectures from opinion leaders, didactic presentations, distribution of printed information) have been shown to result in little to no beneficial effect with regard to changing providers' agency, abilities or practices [24]. Therefore, demand-side incentives should focus on highly effective CME, like ATLS, to realize the greatest return on investment. However, guidelines about frequency of refresher courses and maintenance of verification should be followed to avoid knowledge and skill decay. For ATLS, this interval has been defined as four years [14, 21].

Although there is significant opportunity for increasing the use of demand-side incentives, country directors reported a diverse group of actors already employing them to some degree. Therefore, in addition to prioritizing the use of demand-side incentives to facilitate ATLS promulgation, some guidance and toolkits for national and sub-national actors who might implement such incentives might be useful. Reports of systematic study of demand-side CME incentives have demonstrated that mandating CME through credentialing and regulations alone is not effective. It requires a complement of clear communication strategies, use of empowering education principles (e.g., practical and problem-based learning structures), closely aligning mandates and course content with clinical roles, accommodating CME within the workplace and usual duty hours, maintaining central credentialing oversight, and incorporating specific CME or credentialing requirements within competency frameworks and accreditation criteria [25–27]. These and other best practices for the implementation of demand-side incentives might be collated and useful for promulgation activities and national and sub-national actors.

In most of the world, including some areas of high-income countries, there are critical shortages of surgeons, particularly surgeons well trained in the care of injured patients [28, 29]. Resultantly, governments, health systems and training programs have leveraged non-surgeons and non-physicians to fill surgical workforce gaps and ensure more timely service delivery through task-sharing. [30] These cadres vary by geography, but generally include physician assistants and nurse practitioners, general practitioners and medical officers, clinical officers (i.e., non-physicians with abbreviated, focused training on highly prevalent conditions and their management) and specialized nurses. The intended student pool for ATLS includes both doctors and other locoregionally qualified healthcare professionals who care for injured patients. As an example, Bangladesh has successfully incorporated ATLS into the training program and credentialing process for non-physician cadres after technical consultation and mentorship from the India ATLS program. Given the increasing number of injured patients who are cared for by non-surgeon and non-physician providers through task-sharing programs, demand-side incentives should also be used to increase the uptake of ATLS by these diverse cadres who care for injured patients. For example, ATLS could be a requirement for credentialing physician assistants and nurse practitioners who specialize in emergency medicine or surgery and as a requirement for clinical officer training programs such as those in Malawi, Ethiopia, Niger, Nigeria, and Sierra Leone [31–34]. Similarly, nurses could be required to complete Advanced Trauma Care for Nurses (ATCN), which is organized by Society of Trauma Nurses (STN) and can run in conjunction with ATLS [35–37].

Subsidies were commonly reported as demand-side incentives to reduce the barriers of capital layout for course development, instructor training and student registration and travel. Subsidies could come from domestic government spending, grants, health/academic system funds or development assistance for health (DAH; e.g., financial and in-kind contributions by donor countries and organizations to recipient countries and programs). Although there is a negative effect of DAH on domestic government spending, DAH can be used as a stopgap to support improved trauma care training in countries currently unable to earmark such subsidies toward emergency and trauma care system development [38]. A recent examination of the global landscape of DAH reported that assistance for trauma care initiatives are critically underfunded compared to other health foci with markedly lower disease burdens (e.g., malaria, tuberculosis, HIV/AIDS) [39]. Therefore, responsible disbursements to highly cost-effective projects should be prioritized, such as those that include improving trauma care capacity through subsidized training programs and implementation of other demand-side incentivizes to support their sustainability.

ACS provides ATLS course materials with tiered pricing based on national income level to make courses more accessible to LMICs. ACS is currently working on a modular approach for course content and materials for the next edition of ATLS, which would allow the course to be better adapted to LMICs without compromising on the high quality of education the course provides. Guidance on how to implement ATLS in LMICs and reduce the costs associated with training equipment has also been published [40]. Costs of promulgation can also be supported through grants from the ACS Trauma Global Education Fund, which is based on philanthropic donations to the ACS to support this effort.

**Table 1** Key recommendations stemming from promulgation gaps and opportunities offered by Advanced Trauma Life Support region chiefs and country directors

| Recommendation | Reasoning |
|---|---|
| Use *current* ATLS verification, as opposed to single course completion, as a requirement when able | There is strong evidence that ATLS program-acquired cognitive knowledge declines around year 3 to 4 after course completion [14]. Therefore, the ATLS Student or Student Refresher Course should be completed every 4 years to maintain current verification and adequate cognitive knowledge for care of the injured patient |
| Engage governments, medical or surgical accreditation agencies, professional societies and/or training programs to implement demand-side incentivize schemes that support trauma care-related CME programs, which are currently most often incentivized in an ad hoc manner by individual hospitals and health-systems and often only those within the public sector | When implemented nationally, and particularly in low- and middle-income countries without other formal trauma care-related education programs, demand-side incentives that increase the number of ATLS Student Courses may reduce preventable deaths and disability after injury [9, 15, 16] |
| Develop and disseminate a trauma care-related CME policy toolkit that provides national agencies and stakeholders with recommendations and resources for implementing demand-side incentive schemes for ATLS, ATCN and other trauma care-related CME programs | CME policy and assessment toolkits, such as those offered by the Accreditation Council for Continuing Medical Education (ACCME), Accreditation Council for Graduate Medical Education (ACGME), World Federation for Medical Education (WFME) and World Health Organization (WHO), promote the dissemination, implementation and use of demand-side incentives for CME [17–19]. These toolkits could be adapted to ATLS and other trauma-related CME opportunities |

Several limitations are worth mention. First, not all countries with ATLS programs had respondents to this voluntary survey and low-income countries were not directly represented by a country director. However, each of the region chiefs provided responses after reflecting on the countries they represent inclusive of those without direct country response (Fig. 1). Additionally, several regions were un- or under-represented compared to ATLS program distribution (e.g., Central America, Europe). Despite these country and regional limitations, we reached saturation with regard to responses about demand-side policies and incentives that have been implemented to increase ATLS promulgation. Second, the survey was administered to stakeholders with in-depth knowledge of their representative national and sub-national demand-side factors. However, the responses were not triangulated with other stakeholders to ensure that all factors were both represented and accurate. Lastly, the survey targeted trauma CME. There may be other important lessons to be learned about demand-side factors that influence the development and distribution of other types of CME that might improve the promulgation of ATLS.

## Conclusion

ATLS region chiefs and country directors reported a variety of demand-side incentives that may facilitate the promulgation of ATLS and opportunities to disseminate them more widely (Table 1). These factors include making training program completion, credentialing, hiring, promotion or verification contingent on having completed ATLS. The agencies responsible for overseeing such requirements varied by country, but were typically hospitals and health systems, training programs, professional societies or national or sub-national governments. Subsidies to offset capital outlays and student registration were used to increase course uptake. Several context-specific demand-side factors were also described, including targeting non-surgeons and non-physicians and leveraging non-ACS professional societies with a focus on trauma to support ATLS promulgation.

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