The Global Educational Toxicology Uniting Project (GETUP): an Analysis of the First Year of a Novel Toxicology Education Project

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Abstract The international boundaries to medical education are becoming less marked as new technologies such as multi-user videoconferencing are developed and become more accessible to help bridge the communication gaps. The Global Educational Toxicology Uniting Project (GETUP) is aimed at connecting clinicians in countries with established clinical toxicology services to clinicians in countries without clinical toxicologists around the globe. Centers that manage or consult on toxicology cases were registered through the American College of Medical Toxicology website via Survey Monkey®. Data was analyzed retrospectively from February 2014 to January 2015. Google hangouts® was used as the main conferencing software, but some sites preferred the use of Skype®. Registration data included contact details and toxicology background and qualifications. Thirty sites in 19

different countries in Australasia, Europe, Africa, and America were registered. Twenty-eight (93 %) sites were located in a major urban center, one (3.5 %) site in a major rural center and one (3.5 %) a private practice. Expectations of GETUP included sharing toxicology cases and education (30, 100 % of sites), assistance with toxicology management guidelines (2, 7 %), assistance with providing a toxicology teaching curriculum in languages other than English (2, 7 %), and managing toxicology presentations in resource-poor settings, international collaboration, and toxicovigilance (2 sites, 7 %). Twenty-two conferences were performed during the first 12 months with a mean of 3 cases per conference. GETUP has connected countries and clinical units with and without toxicology services and will provide a platform to improve international collaboration in clinical toxicology.

Keywords Education · Toxicology · Global · Telemedicine

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Introduction

Worldwide, an estimated one million deaths occur annually as a result of poisoning, with a third of these unintentional [1]. The quality of medical care provided to poisoned patients may vary greatly, depending on the resources available to the health care providers and the location. Resource-poor areas often suffer from a shortage of antidotes, equipment, and specialist personnel to optimally manage poisoned patients; furthermore, the agents taken in resource-poor areas can be associated with more severe toxicity [2–4].

The development of medical toxicology as a specialty has served to advance the care of poisoned patients in some countries [5]. However, there still remains a lack of toxicology services and formal training programs in many countries around the world. A recent survey showed only 13 countries

had a recognized training program for physicians, seven of which are recognized by formal certification [6]. Even telephone access to poison information, for both health care professionals and the public, may be lacking, especially in developing countries [7].

As a consequence of limited direct access to poison control centers and clinical expertise regarding the diagnosis and management of acutely poisoned patients, it may be difficult for treating clinicians in developing countries to receive education in medical toxicology. Conferences and academic travel to broaden education can also be costly and have been identified as barriers to medical professionals [7]. Overcoming these barriers to medical toxicology education is essential to improving the management of poisoned patients worldwide.

The international boundaries to medical education are becoming less marked as new technologies such as multiuser videoconferencing are developed and become more accessible to help bridge communication and education gaps [8, 9]. The Global Educational Toxicology Uniting Project (GETUP) is a project aimed at connecting clinicians in countries with established clinical toxicology services to health care providers and poison information center personnel in countries without clinical toxicologists around the globe. This paper describes the development of GETUP, the first-year experience with the project and registration data collected.

Methods

In 2013, three pilot sites (Austin Hospital Toxicology Service in Victoria, Australia; UCSF-Fresno Toxicology Service in CA, USA; and Colonial War Memorial Hospital in Suva, Fiji) initiated GETUP using a monthly teleconference. Following this, a more advanced pilot phase was conducted from June to November 2013 to establish that worldwide, multisite, clinical toxicology case-based education was technically feasible using Google Hangouts® videoconferencing software [10]. Each month, a 1-h session was set up and clinical case stems were emailed to all participants prior to the conference session. Participating sites discussed these cases in detail, with an emphasis on pharmacodynamic, toxicokinetic, and clinical management principles. Summarized learning points were then emailed to participants after these videoconferences. The Australian and Californian sites initially had the premise of educating the Fijian sites. However, all sites found they were learning and receiving the benefits of discussing cases endemic to each region. Direct feedback (verbally and/or via email) regarding satisfaction with the conference and technical difficulties was collated.

As a result of this pilot phase, a committee of toxicologists from multiple countries (including Australia, the USA, and the UK) interested in global toxicology was formed to lead and

advance the project. The American College of Medical Toxicology Board of Directors approved supporting the project as an initiative of the American College of Medical Toxicology (ACMT) International Committee, and in February 2014, the project was officially launched on the ACMT website (www.acmt.net/GETUP.html). Organizations including the ACMT, European Association of Poisons Centers and Clinical Toxicologists (EAPCCT), American Academy of Clinical Toxicology (AACT), Asia Pacific Association of Medical Toxicology (APAMT), Network of African Poisons Centers and Applied Toxicologists (NAPCAT), International Interest Groups of the American College of Emergency Physicians (ACEP), and the Australasian College of Emergency Medicine (ACEM) were invited to register new interested sites. Sites included centers managing poisoned patients, and emergency department doctors, clinical pharmacologists, and medical toxicologists were approached to be part of the project.

New sites were registered through the ACMT website. Medical centers that manage toxicology patients or consult on cases were registered. Centers not involved in the management of toxicology patients or those without access to a computer and Internet service were excluded from the project. Sites joined to deliver education receive education or both. Google hangouts® was used as the main conferencing software, but some sites preferred the use of Skype®. Institutional review board approval at the Austin Hospital in Victoria, Australia, was given to store and analyze the registration data.

An online platform (Survey Monkey®) was used to record the registration data into a database. Registration data included contact details, preference of day and time to conference, toxicology background and qualifications, and preferences on whether looking to conference with a site with or without toxicology services or both.

The next step was utilizing this data to match centers with and without specialist toxicology services/physicians. The sites with specialist toxicology services/physicians chosen to lead education were chosen because they had experience in managing and developing toxicology services and in formal education and training in toxicology. They would indicate this by stating they would like to conference with a site without toxicology services but could also opt to conference with a site with established services. In addition, a “UTC (coordinated universal time) difference” was used to identify sites with similar conferencing time preferences. The day of week, month, and time difference between countries were then used to match conferencing sites. Matched sites were sent introduction letters and given instructions on where to access setup instructions. Different sites were then allowed to discuss with each other frequency and content of conferences. Registration data has been analyzed from February 2014 to January 2015. Major urban center was defined as being in a major metropolitan setting in a town or city, i.e., tertiary teaching hospital.

Major rural center was defined as being in a country setting but could still be the main hospital service.

Currently, sites who are conferencing are mainly discussing cases with learning points chosen by each participating site, some of which have been uploaded to the website. A suggested curriculum had been offered for and is available through the website (www.acmt.net/_Library/GETUP/GETUP_curriculum_overview.docx). Case discussion examples and learning points from past conferences were posted to the website (www.acmt.net/Case_Notes.html). Media of videoconferences which is continuously being updated is also located on the website (www.acmt.net/Media.html). Patients were de-identified in these case discussions, and only the basic demographics such as age and sex were disclosed. A forum for discussion of the project and cases is also available (www.acmt.net/Forum_.html).

The number of sites matched, number of conferences completed, and limitations of the project are continuously being analyzed.

Results

From February 2014 to January 2015, 30 sites in 19 different countries were registered (Table 1). One site that had not conferenced prior to January 2015 was excluded on request of the center. Fourteen (47 %) sites had personnel with formal medical toxicology training, five (17 %) with pharmacology degree backgrounds, and 11 (36 %) had personnel with no toxicology training. Wednesday (17, 59 %) was the most requested day for conference.

Table 1 Sites/institutes registered with GETUP

Country	City/state	Institute
Australia	Victoria	Austin Hospital/Victorian Poisons Center
Australia	New South Wales	Westmead Hospital
Australia	Perth	Sir Charles Gairdner Hospital
Botswana	Gaborone	Princess Marina Hospital
Burundi	Bujumbura	Hope Africa University
Dominican Republic	Santiago De Los Caballeros	Pontificia Universidad Catolica Madre y Maestra
Ecuador	Quito	Poison Information Center of Ecuador (CIATOX)
Fiji	Suva	Colonial War Memorial Hospital
Fiji	Labasa	Labasa Hospital
Fiji	Lautoka	Lautoka Hospital
Germany	Hannover	Private
India	Ahmedabad	CEARCH Poison Control Center
Iran	Tehran	Loghman Hakim Hospital Poison Center
Israel	Haifa	Israel Poison Information Center
Italy	Pavia	Poison Control Center and National Toxicology Information Center
Nepal	Kathmandu	Nepal Poison Information Center
Nepal	Kathmandu	Nepal Disaster and Emergency Center
New Zealand	Dunedin	National Poisons Center
Papua New Guinea	Port Moresby	Port Moresby Hospital
Pakistan	Islamabad	Private
Sri Lanka	Kandy	Kantale Base Hospital
South Africa	Rondebosch	Red Cross Children's Hospital and Poisons Center
South Africa	South Africa	Tygerberg Poison Information Center
UK	London	Guy's and St Thomas NHS foundation trust
USA	Fresno, California	UCSF Fresno Medical Center
USA	New York	Mt Sinai
USA	Columbus, OH	Central Ohio Poison Center
USA	Phoenix, AZ	Banner University Medical Center
USA	Sacramento, CA	KPNC Medical Toxicology
USA	San Francisco, CA	San Francisco Poison Control Center

Twenty-eight (93 %) sites were located in a major urban center, one (3.5 %) site in a major rural center and one (3.5 %) in a private practice setting. Of all participants, 15 (50 %) sites had both a poison information center and toxicology service located on site, three (10 %) sites only had a toxicology service, three (10 %) sites had a poison information center on site but no toxicology service, and one (3 %) had poison information access over the phone only. Eight (27 %) sites had no access to any poison information center or toxicology service. Twenty-six (86 %) sites requested conferencing with a toxicology service and four (14 %) sites (mainly with their own toxicology services) did not. Fourteen (47 %) sites requested conferencing with a center without toxicology services to provide teaching services and learn about poisoning cases endemic to other regions.

Expectations expressed by registering sites of GETUP included sharing toxicology cases/education (30, 100 % of sites), assistance with toxicology management guidelines (2 sites, 7 %), assistance with providing a toxicology teaching curriculum in languages other than English (2 sites, 7 %), managing toxicology-related presentations in resource-poor settings (5, 17 %), international collaboration (30, 100 %), toxicovigilance (2 sites, 7 %), strengthening links between centers, and improving communication between different health services (30 sites, 100 %).

Twenty-three (77 %) sites have been matched during the study period and have begun communication and videoconferencing (Table 2). The other seven (23 %) sites have yet to find a suitable time to conference and are still undergoing the matching process. Eight (26 %) sites have been chosen to lead the conferences so far given their existing toxicology experience and services are all located in major urban centers. Twenty-two conferences have taken place during the first 12 months with a mean of 3 cases discussed per conference. These cases can be categorized into the following exposures: 27 (40 %) pharmaceutical, 10 (15 %) recreational, three (5 %) household products, 17 (25 %) toxinological, four (6 %) therapeutic errors, and six (9 %) pesticides. Currently, no sites have been using the offered curriculum in favor of case-based discussion. However, a beginner's toxicology curriculum in Spanish has been added to the website (<http://www.acmt.net/Links.html>) and will be used in the future to teach emergency doctors in the Dominican Republic.

Three sites (10 %) have moved to Skype from initially trying Google Hangouts. Familiarity, user-friendliness and problems with setting up have been the main reasons for this change.

Discussion

GETUP is an ongoing project aimed at connecting countries through videoconferencing and discussion of toxicology

Table 2 Matched sites in the first year since project launch

Groups	Sites
1	Austin Hospital/Victorian Poisons Information Center, Australia UCSF Fresno Medical Center, Fresno, CA, USA Colonial War Memorial Hospital, Suva, Fiji Labasa Hospital, Labasa, Fiji Lautoka Hospital, Lautoka, Fiji Port Moresby Hospital, Port Moresby, Papua New Guinea
2	Westmead Hospital, New South Wales, Australia Nepal Poisons Information Center, Kathmandu, Nepal Nepal Disaster and Emergency Center, Kathmandu, Nepal Physician Clinic, Islamabad, Pakistan
3	Guy's and St Thomas NHS trust, London, UK Red Cross Children's Hospital and Poisons Center, Rondebosch, South Africa Tygerberg Poison Information Center, South Africa Hope Africa University, Bujumbura, Burundi
4	Sir Charles Gairdner, Perth, Australia Israel Poisons Information Center, Haifa, Israel CEARCH Poison Control center, Ahmedabad, India
5	San Francisco Poison Control Center, San Francisco, USA Logham Hakim Hospital Poison Center, Tehran, Iran
6	Princess Marina Hospital, Gabarone, Botswana Physician, Hannover, Germany
7	Pontificia Universidad Catolica Madre y Maestra, Santiago De Los Caballeros, Dominican Republic Mt Sinai Hospital, New York, USA

cases. Benefits of videoconferencing include real-time interaction without the need to be in one location. A survey of the international membership of ACMT previously identified a general desire among respondents for increased education, international collaboration [7], and access to conference activities. GETUP has been able to fulfill these needs with low-cost, globally feasible solutions.

Countries from throughout the world with and without access to toxicology services joined GETUP. The majority of sites were located in a major urban center. However, it is clear from the data provided by the GETUP centers that being a major urban center does not guarantee access to toxicology services onsite or via telephone.

The initial aims for GETUP were case-based problem solving and general toxicology education. Cases discussed may be unique to geography or common to other locations but with different management challenges depending on local resources. For example, there was a discussion about the use of ethanol in toxic alcohol ingestion management and how this could be used, because of lack of fomepizole availability in Fiji. In addition, education is mutually beneficial as the developing countries may have poisoning experience not frequently seen in western centers (i.e., ciguatera poisoning is relatively common in Fiji, but an infrequent presentation in temperate regions). In addition, a suggested curriculum for those sites wanting to go beyond case discussion has been

offered but as of yet not adopted. This may be that sites prefer case-base discussion rather than a rigid curriculum initially. However, members of GETUP from Mt Sinai Hospital in New York, have developed a beginner Spanish toxicology curriculum and plans are to deliver this to emergency doctors in the Dominican Republic. This could also be delivered to other Spanish-speaking sites.

Registered participants have also raised interest in establishing toxicology guidelines at their center, toxicovigilance, research collaboration, and forming long-term collaborative contacts. Even though the main aims of the project are toxicology education and discussion, the other expectations that have been raised are reasonable and achievable and over time may be part of an evolution of GETUP. We anticipate that this evolution will be site-dependent, and groups will choose which avenues they pursue.

GETUP has the ability to provide training and support to areas where education in clinical toxicology may have seemed unachievable in the past unless educators or trainees traveled. GETUP brings different cultures together, with varying experiences in the management of poisoned patients. In addition, limitations in treatment or access to antidotes can be highlighted and reasons for variations in management are discussed in these sessions.

In the long term, our aim is that GETUP will improve health care provider knowledge, influence patient management through education, and build long-term relationships between health services to improve the management of poisoned patients. Evaluation at regular intervals of the project's user satisfaction, technical issues, and results of formal pre- and post-intervention surveys are examples of methods which will be used to evaluate GETUP. In addition, evaluation of educational effectiveness and gaps is currently a limitation and improving this measurement will be considered in future plans and research.

Limitations

The main limitations of the project relate to conference software and information technology issues. Access to adequate Internet services in resource-poor areas have limited the quality of video during conferencing. The ability to turn off the video transmission while maintaining the audio and chat component of the software may be a way to overcome a heavier data transfer load. Lack of familiarity with Google Hangouts® and problems with setting up and trouble-shooting the software are other issues that arose. However, Internet quality and accessibility have improved over the last decade, and this will continue to improve. Specific centers have moved to Skype® as well as this has been more familiar and user friendly to setup, but is unable to record conferences.

The process of culture change, time constraints, and initial technical information technology issues in busy departments and toxicology services can mean it is difficult to deliver a regular teaching program. However, the project has demonstrated so far that it is possible to overcome these barriers; it can be integrated into usual practice and hopefully will improve over time.

Conclusion

The Global Educational Toxicology Project (GETUP) has connected countries and clinical units with and without toxicology services through videoconferencing and will provide a platform to improve international collaboration in clinical toxicology. Poisoning is an under-recognized burden to global health, similar to many neglected tropical diseases. Part of the problem is that many poisonings and exposures occur in countries and regions that lack medical toxicologists and poison control centers. With GETUP, we are able to discuss case-based management and toxicology research updates with other member sites using free videoconferencing software. This is a pathway to building poisoning management expertise where needed most.

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