A.S.P.I.R.E: A student led initiative to foster a facilitative environment for undergraduate medical research

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Abstract

The uptake of undergraduate research opportunities in India is reported to be disappointing and little is known about the hurdles faced by students in undertaking research activities. As a solution to this issue, a student-led research council named, “A.S.P.I.R.E: Association for Support and Propagation of Innovation, Research and Education,” was formed. Its activities were focused on building a peer-based research environment to learn via module-wise teaching and mentoring sessions, a practical approach to learn evidence-based medicine via journal clubs and maximize the available opportunities via research opportunities database. Research opportunities database is a live dashboard of research projects currently in progress and vacancies therein for undergraduate students, so that they could be a part of the projects in their subjects of interest. Online discussion forums and social media platform were also created to facilitate active discussion and remote learning. 10 peer based teaching sessions and 8 journal clubs have been organized as an outcome of which 46 undergraduate students have undertaken new research activities in a single year. Based on the feedback from both students and faculty members, it can be said that A.S.P.I.R.E, through its systematic and peer-based approach has developed a culture of research and evidence-based medicine among the undergraduate students.

Keywords: Journal club, student council, undergraduate research

Involvement in research activities is crucial for producing doctors with an adequate understanding of evidence-based medicine. The uptake of undergraduate research opportunities in India reported to be disappointing and little is known about the hurdles faced by students in undertaking research activities.[1] Some contributory factors include the lack of basic infrastructure, facilities and structured mentorship programs and absence of additional incentives to researchers.[2] There is a need to practice and teach research from the perspective of an undergraduate and hence inculcate the culture of Research and Evidence-Based Medicine into medical education. A study from Pondicherry, India, showed that a perceived lack of recognition was the constraint in students opting for a research career among a majority of respondents.[3]

This perceptual gap could be a major obstacle to medical
research flourishing among undergraduate students. All medical colleges ought to have an undergraduate research monitoring committee to facilitate and foster the spirit of enquiry that fuels good research.[4] Building on that, we adopted a unique approach through which existing gaps of research knowledge and opportunities could be bridged at our institute. A proposal to establish a Student-led Research Council named, “A.S.P.I.R.E: Association for Support and Propagation of Innovation, Research and Education,” was drafted with the following aims and objectives:

- Collaborate with departments of the institute to educate students on various aspects of research through seminars and workshops and make ongoing research projects more approachable for the students
- Increase the participation of undergraduate students in research projects by helping students find the right mentor and requisites to work on a novel research idea or innovation
- Guide students working on a research study throughout the process with the help of research experts from the institute
- Collaborate with various other institutes and trusts of other disciplines to promote research and innovation.

WORKING MODEL OF ACTIVITIES UNDERTAKEN BY A.S.P.I.R.E.

A working team [Figure 1] was constituted for organizing and coordinating various events and activities of A.S.P.I.R.E. In order to help young researchers overcome the barriers in the existing system, a number of interventions were required. Moreover, it was necessary to tailor these interventions according to the needs of undergraduate students.

Module-wise teaching
Initially, we started a 1-week long research methodology workshop, which was taken by in-house and invited faculty members; however, students’ feedback suggested that these workshops were similar to didactic lectures and focused more on the theoretical aspects, which led to low attendance and poor level of understanding among the students. This approach was revamped and developed into a year-long module-based teaching curriculum which focused more on peer-based teaching under the supervision of respective subject experts [Table 1].

Each module is now taught by the means of:
1. Peer-based research methodology teaching sessions
2. Application-based journal clubs for undergraduates
3. Discussion forums and social media platforms.

PEER-BASED RESEARCH METHODOLOGY TEACHING SESSIONS

Each module starts with an introductory teaching session taken by a student who has adequate knowledge and experience in basic research methodology. The aim of these sessions is to sensitize students regarding the basic terms, steps, and resources. The session also focuses on the practical aspects of research, common misconceptions and ways to overcome hurdles faced by students.

Table 1: Module-based year-round teaching curriculum

| Module number | Topics for modules | Timeline |
|---------------|--------------------|---------|
| Module 1      | Orientation to research - The what, why, and how | March - April |
|               | Literature research |         |
|               | Formulating a research question |         |
| Module 2      | Study designs | May - June |
|               | Questionnaire designing |         |
|               | Protocol writing |         |
|               | Process of IEC submission |         |
| Module 3      | Narrative reviews | July |
|               | Case reports |         |
| Module 4      | Sampling methods and data collection strategies | August - September |
|               | Hand-on biostatistics |         |
| Module 5      | Original article writing | October - November |
|               | Publication |         |

IEC = Institutional Ethics Committee

Figure 1: Structure of working team of A.S.P.I.R.E
undergraduates when performing research. After these sessions, students are provided access to exhaustive reading material and prerecorded videos from standard resources, which help students understand the details and technical aspects of a particular topic at their own convenience.

**APPLICATION-BASED JOURNAL CLUB SESSIONS FOR UNDERGRADUATE STUDENTS**

Through journal club sessions, we aim to promote not only the habit of reading the latest scientific literature but also develop the skill of critical appraisal, thus, inculcating among the students, a culture of evidence-based medicine. Two journal club sessions are held per module based on which specific learning objectives (SLOs) of the sessions are decided. The novel point about our model is that students who wish to present are allowed to search and choose their own papers based on their field of interest. This aids in learning literature search in a more practical way. However, the members of the research guidance team help the presenter choose a paper in a way such that it is in accordance with the SLOs of the respective session. In addition to helping the students select an article, there is usually an experienced student-mentor who guides them to make the presentation more effective and understandable for the audience. These sessions also aim to help students understand the role of evidence-based medicine in managing the patients by encouraging them to actually visit the hospital wards and observe what they have read. This practice brings together research and clinical knowledge. Another novel addition to the model is the “Peer-based Pre-Club Discussion” where an experienced student teaches the basics of study designs and biostatistics used in the paper and thus makes it easy for the audience to understand the presentation in a better way. Two presentations are done in each session followed by discussion with the invited faculty members. The process from selection to presentation for these sessions is depicted in Figure 2.

**DISCUSSION FORUMS AND SOCIAL MEDIA PLATFORMS**

Multiple discussion forums have been created on social media platforms such as WhatsApp, Telegram, Discord, Instagram and Facebook to facilitate active discussion and remote learning. These forums are open to students across the nation and serve as a one-stop center for students to get regular research updates, workshop announcements, find study material, resolve doubts and receive guidance from the mentors and peer researchers.

**Hands-on workshops for learning statistical analysis**

Biostatistical analysis forms an integral part of every research project, but the knowledge and skills regarding the same are poor among the students. The biostatistics taught as part of the curriculum is based on manual pen and paper calculations which are not used in research anymore. Most of the students and even faculty members rely upon the statisticians for this purpose. Considering statistician’s limited availability and additional fees, it was essential to train students in the same, enabling them to perform basic statistical tests and sample calculations using basic softwares.
Database of research opportunities

This is a unique initiative wherein the details of projects under the respective principal investigators (whoever is willing to be a part of this initiative) have been maintained in a real-time database. It is a compilation of the research projects currently in progress and vacancies therein for undergraduate students, so that they could be a part of the projects in their subjects of interest. The amount of information to be revealed on the database is based on the sole discretion of the principal investigators of the respective studies. Based on the vacancies available in various departments, students are allowed to apply and be a part of these projects via the procedure depicted in Figure 3. A student can apply for as many projects he/she wishes to but would be selected for only a single project at a time and would be prohibited to apply for any more projects for at least 3 months. This would provide opportunities for more students to participate and also ensure better compliance and completion of projects in the stipulated time frame. Through this model, not only do the students get the desired project with relative ease, but the principal investigator also gets a more skilled student since A.S.P.I.R.E. teaches and increases the aptitude of medical students in research through the mentioned interventions. Thus, this system is beneficial for both medical students and principal investigators.

Peer-based mentoring for student-initiated projects

A research guidance team has been formed, which consists of students who are or have been a part of at least one research project in the past. They act as the first point of contact for the beginners who want to develop their research ideas. They help students perform a thorough literature search, formulate a preliminary research question and also suggest the appropriate study design for the same. They guide the students regarding suitable department and professors to approach to gain more insights into the projects as well as help them choose the right mentor. As mentioned earlier, Faculty members of medical colleges are often overworked and hence are unable to dedicate enough time to closely mentor undergraduate students. Hence, having a peer as a mentor solves this problem by bridging the knowledge gap between the student and the faculty.

RESULTS

Although A.S.P.I.R.E. was established in May 2020, a fixed model for most of its above-mentioned activities was developed by February 2021, after which the Research Opportunities Database and Module Wise-teaching Method was adopted. While 55 undergraduate students were involved in different research activities from 2015

Table 2: Number of activities conducted by association for support and propagation of innovation, research, and education and its outreach

| Variables                                      | Numbers  |
|------------------------------------------------|----------|
| Activities                                    |          |
| Peer-based research methodology teaching sessions | 10       |
| Journal clubs                                 | 8        |
| Talks by experienced students to share their research journey | 6        |
| Outreach                                      |          |
| Forum members across WhatsApp, Telegram, and Discord | 7567     |
| Instagram (aggregated reach)                  | 65,256   |
| YouTube (total views)                         | 15,855   |

Figure 3: SOP for journal club sessions for undergraduate students
to 2020, an additional 46 new students have undertaken research activities within the span of a single year since its inception. Of these, 31 students have been recruited via the Research Opportunities Database. An account of the number of activities conducted by A.S.P.I.R.E and its outreach as of August 2021 is mentioned in Table 2.

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Conflicts of interest
There are no conflicts of interest.

REFERENCES
1. Murdoch-Eaton D, Drewery S, Elton S, Emmerson C, Marshall M, Smith JA, et al. What do medical students understand by research and research skills? Identifying research opportunities within undergraduate projects. Med Teach 2010;32:e152-60.
2. Garg R, Goyal S, Singh K. Lack of research amongst undergraduate medical students in India: It’s time to Act and Act Now. Indian Pediatr 2017;54:357-60.
3. Datta SS, Borame AV, Singh Z. Attitude, perception and demand for research among medical undergraduates in a teaching medical institution in South India. Indian J Public Health Res Dev 2012;3:139-43.
4. Chatterjee K, Sen C. Undergraduate research in India hoping for a new dawn. J Postgrad Med 2016;62:49-50.