

Case Report

# Chinese Postgraduate Medical Students Researching for Publication

Yongyan Li

Faculty of Education, University of Hong Kong, Pokfulam Road, Hong Kong, China; yongyan@hku.hk

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**Abstract:** The value of including a research component in medical students' training programs has been widely recognized. Nevertheless, examples of how this may be done are rarely found in the literature. The case study reported in this short paper aimed to address this gap in the literature by investigating how a group of postgraduate students attached to the Orthopedics Department of a major hospital in China engaged in research for publication. Fourteen students were interviewed, and their "mission lists" were analyzed to reveal the students' research profiles, the sources of their research ideas, and their data collection activities. The study showed that the students pursued more clinical than basic research topics, their research topics often fell under their immediate supervisors' larger projects, and the students were actively engaged in the gathering of research data on the wards and at the outpatient clinic. The reported study does not claim generalizability of its findings. More of such reports from various settings in different parts of the world are needed to enhance constructive exchanges and mutual learning.

**Keywords:** postgraduate medical students; medical students' attachment in hospitals; research activities in hospitals; writing for publication

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## 1. Introduction

The benefits of including a research component in the training of medical students at both undergraduate and postgraduate levels have been extensively discussed. It has been argued, for example, that experiencing research first-hand translates into training in evidence-based medicine, and potentially creates cadres of future clinical researchers [1–3]. In addition, student research activities facilitate the research productivity of an institution, while their research publications would give them a future advantage in the job market [4,5]. Although most of these discussions addressed Anglo-American contexts, the same analyses more or less apply to the situation in many non-English-speaking countries. Yet, irrespective of the context, little is known as to how medical students actually engage in research during a study program. This gap is curious and should be filled. The present paper takes a step toward addressing the gap by featuring a cohort of postgraduate medical students attached to the section of spine surgery in the Orthopedics Department of a major hospital in China engaging in research for publication. Specifically, the study to be reported below aimed, firstly, to provide an overview of the students' research activities; and secondly, to understand the sources of their research ideas; and thirdly, to describe their data collection strategies.

## 2. Methods

Ethical approval for the present study was received from the Human Research Ethics Committee of the researcher's university before data collection began. The study was conducted at the Orthopedics Department of a major teaching hospital in east China as part of a larger project aimed at investigating the research activities at the department (see [6,7]). The department treats a huge number of patients every year. In 2011, for example, its outpatient clinic (OPC) treated around 97,000 patients, its doctors

performed nearly 6200 operations (including those performed at the Emergency Unit for patients who were not hospitalized), and 4300 patients were discharged from its wards.

For its research purpose, the study chose to focus on the department's spine surgery section, headed by the department's research-committed director, as it is both research-active and usually has the largest number of attached postgraduate students compared with other sections of the department (See [8] for an illustration of the structure of medical education in China). The postgraduate students attached to the section are in a two-tier supervision scheme: they work closely with their immediate supervisors who are front-line surgeons in the section (hereafter "second-tier supervisors", as they are called in the section), and are under the general supervision of the section director. The section director (chief doctor) and most of the second-tier supervisors (all associate chief doctors) also have a teaching position at the School of Medicine of a nearby university and/or another medical university in the city, for which the hospital is a teaching hospital. All the students and the second-tier supervisors have a so-called "mission list" (English used for the document in the section) which enumerates in tabular form one's ongoing research topics and submitted/published papers.

The primary dataset of the study consists of the researcher's semi-structured interviews with 14 out of a total of 21 postgraduate students attached to the spine section at the time of the study. The 14 student participants, all male and approached through one student representative, included 10 Master's students and four doctoral students under the supervision of six second-tier supervisors (each student having one such supervisor). The sample size of 14 was determined by the availability of the students for interview, rather than the saturation of themes in the analysis. The researcher did not know any of the students in person prior to the interviews. The interviews, primarily based on talking from each student's mission list, focused on exploring the sources of ideas of the listed topics, and the students' data collection strategies. Questions such as "Where did this topic come from? How did you collect data for this study? How did you access the section's database? and What exactly do you mean by 20% of completion for 'data collection'?" were asked. The interviews lasted an average of 40 min each and were conducted in Mandarin Chinese. The verification of the students' testimonies in the interviews was achieved, firstly, by the researcher seeking clarification from the students during the interviews, as well as through emails afterwards to arrive at a coherent picture; secondly, by the researcher's fieldwork in the larger project (of which the present study was a part): attendance at several of the section's monthly research meetings, observations at the OPC and on the wards, and interviews with the second-tier supervisors (focusing on the publication requirement and research activities in the section), as well as with the section secretary (focusing on the creation of a database in the section); and thirdly, by having a draft of the present paper checked by a postdoctoral fellow working in the section. The interview recordings were transcribed and coded in NVivo (a qualitative data analysis software program) using a data-driven approach, with reliance on topic and analytic coding [9] and the coding repeatedly checked and adjusted by the researcher over a period of several months.

### 3. Results

#### 3.1. The Students' Mission Lists and Research Topics

The students' mission lists follow a template, mapping out their research topics in "basic research tasks," "clinical research tasks," "papers under review," and "published papers." Each topic, in the form of the title of a planned paper, is prospectively depicted as progressing on a course of idea, protocol, data collection, data analysis, and writing, with the targets of completion indicated by stages (around two months for one stage), such as "2012-Stage I data collection 40%" and "2012-Stage IV writing 20%". The students are expected to keep to their timeline and volunteer to present on the progress of their on-going topics at the section's monthly research meetings, for discussions and for comments from the section director. An idea and its protocol must be approved by the director before a student can go ahead with data collection. A new topic may be added to a student's mission list as

a result of research meeting discussions, and a topic deemed unfruitful may be deleted from one's mission list. Those topics that are not completed (in the sense of publishing the target paper) before a student's graduation will be passed on to other students or new students.

Table 1 indicates the study program and year of study for each of the 14 interview participants (referred to as S1–S14) at the time of the present study, and shows their research profile in terms of the numbers of basic and clinical research topics, papers under review, and papers published (since they entered the department).

**Table 1.** The Student Participants' Research Profile.

| Students | Program and Year of Study | No. of Basic Research Topics | No. of Clinical Research Topics | No. of Papers under Review       | No. of Papers Published |
|----------|---------------------------|------------------------------|---------------------------------|----------------------------------|-------------------------|
|          |                           |                              |                                 | 'C' for Chinese; 'E' for English |                         |
| S1       | Master's Year 1           | 1                            | 4                               | 1 (C)                            | 1 (C)                   |
| S2       | Master's Year 1           | 1                            | 6                               | –                                | –                       |
| S3       | Master's Year 1           | 1                            | 4                               | –                                | –                       |
| S4       | Master's Year 1           | 1                            | 3                               | –                                | –                       |
| S5       | Master's Year 1           | 1                            | 3                               | –                                | –                       |
| S6       | Master's Year 1           | 1                            | 6                               | –                                | –                       |
| S7       | Master's Year 2           | 2                            | 6                               | –                                | 1 (C)                   |
| S8       | Master's Year 2           | –                            | 6                               | 1 (C); 1 (E)                     | –                       |
| S9       | Master's Year 3           | 1                            | 2                               | –                                | 2 (C)                   |
| S10      | Master's Year 3           | 1                            | 3                               | 1 (C); 2 (E)                     | 1 (C)                   |
| S11      | Doctoral Year 1           | 3                            | 11                              | 1 (E)                            | 1 (C); 2 (E)            |
| S12      | Doctoral Year 1           | 1                            | 4                               | –                                | 1 (E)                   |
| S13      | Doctoral Year 1           | 1                            | 6                               | 2 (C)                            | –                       |
| S14      | Doctoral Year 2           | 2                            | 7                               | 1 (E)                            | 2 (C); 1 (E)            |

Table 1 suggests that at the time of the study, the students had a total of 17 basic topics (Mean = 1.21), 71 clinical topics (Mean = 5.07), and a total of 7 and 4 papers published in Chinese and English respectively, in addition to a number of "under review" papers. Apparently, with the many topics listed in their mission lists, the students are encouraged to go beyond the publication requirement set by their universities, which usually consists of one article in an indexed Chinese journal for a Master's student, or two articles in overseas English-medium SCI (Science Citation Index) journals (or one such article plus two Chinese papers) for a doctoral student. To manage their many topics, the students generally prioritize a topic for which there are ready data (e.g., utilizing their section's database; see below) or for which data collection is relatively short-term, and aim to write up the paper before moving on to the next topic of focus.

### 3.1.1. Basic and Clinical Research Topics: Where They Come from

A student's basic research topic is often part of a larger project of which the student's second-tier supervisor is the principal investigator. In such cases, a listed topic may have been more or less designated by his supervisor when a student first entered the department. However, a basic research topic can also be proposed by a student's second-tier supervisor or the section director in light of some clinical discovery (e.g., considering the possibility of genetic cause, from three members in a family having the same rarely-found orthopedic problem). Occasionally, a basic research task has been derived from a clinically-oriented topic listed under the name of a fellow student.

Most clinical topics have been suggested by the section director or the second-tier supervisors. If a topic is suggested by the section director, this can be at the section's daily morning report sessions attended by doctors and students (case report topics in particular tend to be raised at this time when the director checks through patient records); or it may be during a monthly research meeting following some discussion, or at the end of such a meeting with the director handing out sheets of paper recorded with topics to a second-tier supervisor, or "bidding" for student volunteers to take on. According to the students, the ideas proposed by the director stem from his clinical experience and/or journal article

reading, or from a recent attendance at an international conference overseas. When a topic is initiated by a second-tier supervisor, it can be at a supervisory meeting with his students, in light of his clinical experience and/or reading, or at the students' Monday morning reading report session where the supervisors take turns to attend.

A small number of basic and clinical research topics have been initiated by the students themselves, often in consultation with a fellow student, on the basis of reading and with reference to the previous topics in their teams, and/or the data available. Yet another set of topics have been inherited from a previous student or passed over by a current fellow student (e.g., as a result of the latter's adjustment of research focus).

### 3.1.2. Using Databases

The spine section has an ever-expanding database of digitalized clinical case records of the patients hospitalized in the section from the early 2000s. The database is organized by digital folders labeled after the patients' names plus consecutive numbers. A particular patient-case folder typically includes a photo of a film parcel of the patient (which shows name, age, gender, diagnosis, etc.), and pre- and post-operative X-ray films, CT films, MRI films, and appearance photos. Searching through the database is made possible by the use of a data management platform. To access the data in the system, the students should first decide what they want through searching, and then submit an application to the section director. Following approval, the section secretary will download the relevant folders to a desktop computer located in a classroom at the section for the students to access and conduct measurements and statistical analyses accordingly.

The students can gain access to those radiographic films that have not yet been gathered into the section's database (by the section secretary) as well as old films missing in the database with authorization through the Radiography Work Station, which is a computerized system hosted by the Radiology Department of the hospital that automatically stores all films shot at the hospital. Other than making use of the section's database and the Radiology Department's storage of films, the students collect much of the clinical data they need in person, primarily at the OPC, as shown below.

The spine section also has a databank of blood samples, which is used for laboratory-based research. As discussed below, the students play a major role in building this databank through their accumulation of blood samples at the OPC.

### 3.1.3. Collecting Data for Research

Against a backdrop of increasing emphasis on ethical research in medicine in China [10], the hospital has a Committee on Medical Ethics that is in charge of the ethical clearance of the research projects proposed by its staff. The students, overseen by the section director and their second-tier supervisors, are expected to observe ethical mandates in their data collection activities. The general practice among the students is to explain the research purpose of the data collection to the patients and obtain informed consent orally whenever necessary.

#### *a. Collecting basic research data on the wards*

On the wards, a student obtains a patient's blood sample from a nurse, who conducts exsanguination with the patient for routine check in the morning, and a student obtains a bit of a patient's tissue sample at the operation room, with the help of a doctor performing the operation and a nurse on duty. In both cases, communication beforehand with the medical staff and the patients concerned is needed. At the OPC, as noted below, blood samples from patients are taken in a "back-stage" room (as the students call it).

#### *b. Collecting clinical and basic research data at the OPC*

All 14 students work as assistants to the section director at the OPC, for two half-days a week. The number of patients they receive on each half-day can vary from 70 to over 100 (the latter during

primary/secondary school students' summer holidays). The section director circulates between several diagnosis rooms to see patients, while the students distribute themselves in different locations—the front-desk, diagnosis rooms, and a “back-stage” room—and combine their assistant jobs with data collection in teamwork.

Two students stationed at the front-desk make sure the incoming registered patients have all the needed films ready before they are allowed in. As they conduct this screening, if they come across a case that matches a research topic of a fellow student, they would quickly note down on a sheet of paper the name of the patient with a brief label of the issue concerned (e.g., “brace”), together with the name of the fellow student. They would deliver the sheets of paper during breaks to the diagnosis rooms inside for the fellow student's attention. As the students have frequent opportunities to hear each other's work (in particular at monthly research meetings of the section), they know each other's topics well and are therefore able to pass on information. Such teamwork is in fact strongly encouraged by the section director and their second-tier supervisors.

Two or three students work in each diagnosis room: they elicit a patient's report of his/her problems and write the patient record to pave the way for the section director's visit to the patient when it is the latter's turn. They may also scribe the director's diagnosis and instructions into the patient record and help to re-state and clarify points to the patient when the director has moved on to the next patient. In the process, as they come across a patient whose case falls under his own or a fellow student's topic, he would pencil “To [his own/a fellow student's name]” on the front side of the film parcel of the patient; a student responsible for using a digital camera to photograph the patients' films (against a negatoscope) together with the front side of the film parcel would then be able to send the photographs afterwards to the relevant fellow students.

Finally, another two students work in a “back-stage” room, where they perform such procedures as measuring and recording the weight, height, and arm span for patients as necessary, conducting blood extraction (usually on a patient's first visit) after explaining the relevant research purpose to the patients and obtaining their consent orally, and helping patients to fill out a questionnaire which evaluates their quality of life. The measurements and the questionnaire information serve both as an important part of the patients' clinical records in longitudinal monitoring and as potentially valuable research data. The blood samples collected are added to the section's databank of blood samples for laboratory-based research.

The complete set of relevant information and films for a patient who passes from the OPC to the wards where he/she undergoes a surgery will be gathered by the clinical front-line second-tier supervisors for the section secretary to input into the section's database. The case data of those patients who come to the OPC for regular checks or post-operative follow-up checks are collected by the students, as described above. The radiographic data amassed by the students in effect form their “personal databases” (likewise organized by folders for individual patients), which they use for their clinical research topics. Before leaving the department at graduation, the students will, as required, copy all the radiographic data they have gleaned over time on a CD-ROM to submit to the department and delete any backups from their files.

#### 4. Discussion

The Results section above provided a profile of the research activities of a group of postgraduate students attached to the spine section of the Orthopedics Department of a major hospital in east China. It is shown that they pursue both basic and clinical research topics, although the latter far-outnumber the former, as shown in their “mission lists.” Their basic research topics often constitute part of the larger projects undertaken by the second-tier supervisors, while their clinical topics tend to have been proposed by the section director or the second-tier supervisors. Less often, a topic may have been initiated by a student himself or taken over from a fellow student. Although they utilize existing databases, the students are actively engaged in data collection at the OPC and on the wards.

The fact that the focal students' research topics have diversified origins and have been raised on various occasions echoes observations noted in the literature [11,12]. In particular, a vast majority of all of the students' topics have been proposed by the section director or the second-tier supervisors based on their clinical experience with reference to potential gaps in the literature, which serves to underscore the importance and relevance of patient-oriented research in academic hospitals [13]. In the spine section where the present study was conducted, dominance of patient-oriented research topics over laboratory-based topics is facilitated by the extraordinary abundance of patient-case resources, and by the students being able to receive guidance from the front-line doctors in selecting topics and collecting and analyzing data. In addition, the publication pressure would also stimulate the favoring of topics that enable them to use readily-accessible clinical data (in the department featured in the study, there is also a publication requirement for the second-tier supervisors—specifically, at the time of the study, publishing two SCI English papers every three years and two indexed Chinese papers every year, see [6]). At the same time, as the study shows, the affluence of patient resources also means the richness of blood samples which form the foundation of the basic research in the section.

In relation to making good use of patient data, the value of gathering such data and building ever-expanding databases for both clinical audit and research purposes cannot be overstated [14,15]. The study reported here indicates that some systematic efforts are made in this regard at a surgery department of a major Chinese hospital, with postgraduate students making crucial contributions in the undertaking. It might be suggested that databases can also potentially facilitate research exchange between physicians working in different contexts with different patient populations.

One issue that merits a note, however, is that although it was mentioned earlier (at the beginning of Section 3.1.3) that the hospital where the study was conducted has a Committee on Medical Ethics and the students are expected to abide by ethical codes during data collection, from an outsider's point of view, how and to what extent informed consent was sought from patients is not clear. This might be an area for both future research and improvement of practice.

## 5. Conclusions

Being conducted at a specialist section of one surgery department at one reputable hospital in China, the findings reported in this paper are not generalizable. However, the study contributes to the literature in two important ways. Above all, the study demonstrated how a group of postgraduate medical students engaged in research activities in a particular hospital context. Given the general lack of such research, the study has generated some baseline data for comparison with other contexts that may be featured in future research. Secondly, in investigating the impact of publication requirements on researchers' lives and career paths, previous research has focused on university contexts (e.g., [16,17]). This paper presents a picture from a professional setting where research plays an important role and demonstrates how research for publication activities are situated in local contexts and conditions.

Insights into the kind of research-oriented medical training scenarios as showcased in this paper are long over-due. More of such reports from both English-speaking and non-English-speaking settings are needed to enhance constructive exchanges and mutual learning. One area that medical specialists and trainees in developing countries such as mainland China may find especially valuable to learn from their overseas counterparts' practices is perhaps in the realms of dealing with ethical challenges in research, in particular in terms of coping with "the clash in agendas between the clinician and researcher roles" ([13], p. 249).

Looking into the future, whereas there has been continued concern in the West over the declining population of clinician researchers [18,19], it is likely that Chinese clinician researchers are growing in number, as more research-trained postgraduate students join the workforce of physicians.

**Conflicts of Interest:** The author declares no conflict of interest.

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