

Clinical Nurses' Contribution to Oncologist Research: Perspectives from a Medical Environment

Dr. Rebecca Chapman¹, Dr. Anthony Fraser²

¹Faculty of Health Sciences, University of Greenwich, London, United Kingdom

²Faculty of Health Sciences, University of Greenwich, London, United Kingdom

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Abstract

Clinical nurses are critically involved in bridging that gap between patient care and research, especially in oncology. In Brazil, oncology nurses play an important role in the initiative and implementation of research studies, as well as the follow-up of these efforts to contact insured patients in an ethical and patient-focused manner. They contribute to the process through the recruitment and education of the patients, in the collection of data and observing the outcome of treatment thus making the research findings more applicable and quality. These nurses also enable interdisciplinary cooperation, transferring the evidence-based practices into the management of everyday clinical work. This paper reflects on the experience of oncology nurses working in Brazil and their contributions to research in a multi-dimensional nature, challenges they face, and the efforts they make to incorporate research in the practice. Knowing these roles is a reminder that nurse-led research projects should be encouraged to enhance patient outcomes and to make progress in the field of oncology.

Keywords: *Oncology nursing, research contributions, Brazil, clinical practice, nurse-led research, evidence-based care, interdisciplinary collaboration, patient-centered research.*

1.Introduction

It is impossible not to notice that the evolution of healthcare delivery systems has been shaken by tremendous changes over the course of the last few decades, among which the appearance of specialized nursing roles connecting the clinical practice with scientific research took their place. Of these changing roles, one that has become increasingly influential has been that of the research nurse, most notably in the area of oncology, where patient care intersects with scientific discovery in a way that makes such a niche position a very attractive means of professional development, and institutional development as well. The modern world of healthcare requires professionals who cannot only smoothly operate along the dual relationships between the caring nature of patient care, and the scientific rigorism of research, but also to exist as a professional who is sought out by two different communities(1).

The idea that research nursing was a specialty was rooted in the realization that the conventional nursing involvement, despite its critical role in taking care of the patients, needed the following of comprehensive, more proficient levels with reference to research strategic alignments and specialization in research practices. This has been especially true with regard to oncology environments in which the rate of scientific advancement, complexity of treatment strategies, and the dearth of evidence-based practice has created an environment in which research nurses can truly excel and contribute powerfully to not only patient care outcomes, but also scientific knowledge. A paradigm shift toward integration of research activities into nursing practice introduces the possibility of appreciating intellectual potential associated with nurses and having them contribute towards scientific efforts in a substantial way and yet not ceasing to remain focused on patient care as their eventual outcome.

Oncology research nurses play a special role in the ranks of the health care system as they are important intermediaries between clinical and research aspects. Their activities include a wide range of responsibilities far beyond the conventional nursing care and these include developing and managing research databars, managing clinical trials, recruiting and supervising patients, ethical monitoring of research actions, and converting research findings into tangible services. This versatile job is of a highly specialized nature that demands a complex knowledge of not only nursing values but also research methods, which makes research nurses one of the most dedicated professionals that can offer their ideas to both the development of oncological science and practice.

The case of the Brazilian healthcare system on oncology research nursing is an outstanding example of how the development of specialized nursing activities can be entrenched within the institution framework. The creation of research nurse positions in Brazilian cancer centers shows how it is possible to find a long-term and effectual role that can be mutually beneficial to any given institution and the scientific community in general. The roles have

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developed due to the shift in research support roles to be a formal, professional position, with a set responsibility and a defined career progression path and demonstrable outcome. The experience of Brazil demonstrates that institutional dedication to research excellence can make it possible to give the professionals of the nursing field the chance to expand the scope of their practice as contributors to institutional objectives and scientific development(2).

The evolution of the research nursing roles indicates the more general pattern of professionalization of healthcare work, where workers are assigned distinct responsibilities to meet the particular institutional demands and create avenues of professional development to nursing professionals. This is the current trend in healthcare delivery models, which are interdisciplinary in their nature, evidence-based, and focus on continuous quality improvement. Research nurses exemplify such principles since they are partnering with physicians, researchers, and other healthcare workers in the process of research activities, but they also make sure that their activities are carried out in the highest standards of scientific rigor and ethical integrity.

The effect of the research nurses goes beyond the local organization level and contributes to the national and global scientific cooperation promoting improvements in oncological knowledge and patient outcomes. Research nurses ensure that their skills and knowledge are shared with the rest of the world through their involvement in multicenter studies, international research networks, and professional associations, which assures the oncological community with best practices, knowledge exchange across institutional boundaries, and increased contribution to the overall body of oncological research(3). The larger effect sheds some light on the necessity to invest in research nursing positions and contribute to the education of nurses who decide to pursue a career in the research area.

The research nursing educational requirements, as well as, the professional competencies relevant to research nursing are indicative of the advanced nature of research nursing. Research nurses need to have highly developed expertise on the subject of oncology nursing, research methodologies, ethics, regulatory standards, and data management information systems. The applicants also require having excellent communication skills, detail orientation, cultural competency and ability to operate within interdisciplinary teams. These requirements indicate the sophistication of the modern stage of oncological research and the necessity to have highly qualified professionals who can operate within the field of tension between clinical work and scientific investigations.

The evolution of research nursing seems to be favorable as the role of this specialized nursing profession becomes increasingly recognized with the benefits it can offer to a healthcare organization and the scientific community at large. With the continued growth of a more personalized, evidence-based healthcare, there will be a growing need to hire research nurses. Such growth potential opens to the possibilities of nursing professionals to be able to form specialized knowledge, advance their careers and make a significant contribution to the scientific discoveries whilst continuing to uphold their interest in patient care and advocacy.

2.Methods

2.1 The Study and Theoretical Framework

This research used a 3-year longitudinal descriptive study along with a mixed-method design to look at how the research nursing jobs developed as well as the effects of the same in a specialty oncology facility. The research approach was based on the approach of an organizational case study, but it could enable thorough analysis of the changes within the institution in a long process between 2001-2017. The theoretical framework was based on the professional development theories, organizational change theories, and healthcare quality improvement concepts to gain a better perspective on how specialized nursing roles develop and change as a part of the institutional goals. In this way, the two main criteria that allow comprehensive analysis of both quantitative indicators of productivity and qualitative organizational effects of the program development of research nursing could be considered(4).

The choice of the single-institution case study design was dictated by the uniqueness in developing research nursing and the need to study it longitudinally in a detailed manner that would not otherwise be possible in the multi-institutional setting. Through this comprehensive duration of study, enough information was found to establish the trends, patterns and developmental stages of research nursing research as well as relating the maturation of programs to institutional success. The mixed approach allowed objective measurement and a contextual understanding to complement each other in a more balanced picture of both program relevant outputs and organization processes that lead to program success.

TABLE 1 Data Collection Framework and Measurement Domains

Domain Category	Specific Indicators	Measurement Frequency	Data Source	Validation Method
Database Management	New database creation	Monthly	XUSD® Platform	Automated validation + supervisor review
	Database updates/maintenance	Monthly	XUSD® Platform	System logs + manual verification
	External database integration	Quarterly	Manual reporting	Peer review + technical audit
	Data quality assessments	Monthly	Automated reports	Statistical validation checks
Patient Management	Recruitment activities	Weekly	XUSD® Platform	Cross-reference with clinic schedules
	Screening procedures	Weekly	Electronic records	Protocol compliance review
	Consent processes (TCLE)	Daily	Digital forms	Ethics committee monitoring
	Follow-up coordination	Monthly	Integrated systems	Patient contact verification
	Adverse event management	Real-time	Safety reporting system	Regulatory compliance audit
Regulatory Compliance	Ethics submissions	Per submission	Brazil Platform	Committee acknowledgment
	Protocol adherence monitoring	Monthly	Study-specific systems	Principal investigator review
	Documentation compliance	Weekly	Document management	Random audit sampling
	Training completion	Annual	Learning management	Certification tracking
Scientific Output	Manuscript contributions	Per publication	Publication database	Author verification
	Conference presentations	Per event	Professional records	Program committee confirmation
	Educational activities	Monthly	Training records	Participant evaluation
	Peer review activities	Per review	Journal systems	Editorial confirmation

2.2 Infrastructure and Systems for the Collection of Data

The major data collection system was based on the institutional XUSD (R) (Extensible Unified System Data), a comprehensive electronic information management system designed to help research nursing in productivity tracking and evaluation. The Department of Medical Informatics of the International Research Center created this platform to meet the special needs of research nurses, such as the necessity to use longitudinal following, multiple-dimensional productivity assessment, and a perspective on other information systems used by the institution. The platform design featured user authentication schemes, data validation methodologies and automatic reporting facilities that were used to monitor the research nursing activities in real-time and preserve the integrity and security standards of the data(5).

The scope of the system implementation including its high degree of customization was to meet the wide variety of activities that the research nurses carry out, such as database development, managing patients, adhering regulatory compliance, coordinating biological samples, and monitoring scientific output. The research nurses were issued with personal passwords and trained on the correct ways of data entry and data consistency in the processes became essential. The platform created a comprehensive record of data to help individual performance

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evaluation as well as the evaluation at the program level through a generated monthly report supervisor to review, and an annual editorial report to assist in the future institutional planning.

Data validation actions involved automatic consistency checks, supervisory review and auditing actions so as to attain accuracy and completeness of data recorded. The system included timestamping capabilities on all entries, and this allowed examination of work patterns and productivity trends with time. Connection with other institutional systems, e.g. electronic health records, research management systems, enabled full tracking of research nursing efforts, and minimized any procedures requiring repeated entry of the same data.

2.3 Measurement Framework on significant productivity

The measurement system of productivity in research nursing consisted of the six key areas of research nursing activity with the specific indicators and measurement criteria aimed at capturing all the contributions of research nursing activity. The Database domain contained the measures of not only XUSD-based but also external databases, that is, how many new databases were created, how much data was entered, what were done to maintain databases and how integrated the databases have become(6). These measures acknowledged the technical and intellectual difficulty involved in database work, and the long term nature of data base management processes.

The TCLE (Termo de Consentimento Livre e Esclarecido) province monitored the processes of the informed consent, such as: application of consent forms, patient teaching programs, tracking the frequency of consent, and the compliance with the documentation. This area appreciated the fundamental essence of ethical compliance in the research practices and it also considers the fact that satisfying proper consent processes is time consuming. The Biological Material domain deal with coordination of the specimen collection, and supervision of the processing, storage, and transport of biological materials, and it can be interpreted as an overall supervision of the sample management requirements of translation research and biobanking processes.

Patient Management metrics were on recruitment process, screening, follow-overs and adverse events and were so designed to cover all aspects of patient care in a research practice. Research Ethics dimension tracked the regulatory submission and data monitoring of protocol compliance, as well as activities associated with dealing with ethics committees, which are essential to the role of research nurses in ensuring ethical standards and regulatory compliance are upheld. The Disclosure domain measured the contribution relating to scientific output such as preparation of manuscripts, presentation of papers and teaching.

How to Evaluate and Analysis Performance?

The performance evaluation system included the individual study and aggregate types of analysis to provide the assessment of individual contribution as a research nurse and identifying the trends and patterns within the program. Individual assessments were made using standard productivity measures that were applied uniformly among all research nurses thereby enabling equitable comparison and the generation of the best practice. The monthly evaluation cycles gave feedback on performance correction and the annual assessment was used to make plans on careers and allocation of resources.

Composite analytical tools deployed were trend analysis, analysis of comparative results in the various departments, and the correlation of research nursing activities and overall institutional outcomes. Analysis procedures included descriptive statistics to measure basic productivity, trend analysis to measure patterns over a period of time, and comparisons to benchmark the various analyses. The anatomy of analysis incorporated both the qualitative measurement and qualitative assessment requirements integrating both the job supervision reviews and the peer review systems along with the objective measurable productivity indicators.

2.4 Quality Assurance & Validation Process

Other measures such as quality assurance procedures were developed to allow a high degree of accuracy, consistency and reliability of data collection and analysis processes which were achieved through multiple validation mechanisms. Primary validation was done at real-time-data-entry stage within the XUSD system performs range validation, consistency testing, and detection of incompleteness. The second layer of validation involved the incorporation of supervisory review processes that involved review of monthly reports by the department coordinators to ensure that they are accurate and complete before their submission.

Tertiary validation was through regular pervasive auditing of the data correctness, system performance and validity of measures. The content of these audits was data entry accuracy by sample checking, system reliability by monitoring performance and measurement validity by correlating with outcomes. Using the multi-level validation strategy, the level of data quality was assured with the possibility of modifying the system and assessments to increase data quality.

2.5 Ethical issues and compliance

The study was conducted in line with institutional research ethics standards and professional guidelines on organizational research, but did not mandate formal ethics committee approval by dint of the study being an organizational experience report rather than human subjects research. The data collection methods worked on the privacy of individuals by not identifying any particular information about an individual and reporting the measures of productivity in an aggregate form. Each user was only permitted to access individual performance data when they were part of authorized staff that had a legitimate supervisory interest(7).

Confidentiality protocols were put in place so that the performance information on individual research nurses was not used except in legitimate organizational purposes such as performance evaluation, professional development training planning, and resource assignment decisions. The research schema was informed by the principles of organizational transparency, in accordance with the expectations in the protection of privacy rights of individuals and ensuring the professional confidentiality dominants.

3.Results

3.1 Organization change and post formulation

The changes in the position of research nurses at the oncology center showed a significant pattern of organizational development that was not only as a result of the oncology center strategic planning but also as a result of the responsive oncology center to developing demands of research. The relative isolation in 2001-2004 was an exploratory period as traditional nursing staff began taking on research-related tasks, but did not have formal role definition nor special training. In this seminal time, two nurses started to integrate research procedures into clinical practice, including mainly process of collecting basic data and coordinating patients to participate in investigator initiated studies. This formative period brought good lessons in terms of the potential of nursing to contribute to research endeavours, also indicating the necessity of more formalised systems of role formulation.

The middle-sized development stage took place in 2004-2013 when the development took place in a systematic manner, and the number of research-, focused nurses increased to eight permanent positions in various sections. This growth was simultaneous with increased institutional research activity, increased regulatory demands and an appreciation of the specific skills needed to support research effectively. The professional validation by the designation of Research Nurses in 2008 was a decisive step towards professional recognition, formulation of specific job duties and professional expectations, as well as defining career progression. It was through this formalization that more efficient recruitment, training, and retention of qualified personnel were achieved as well as the provision of institutional legitimacy to the research nursing activities.

The period of mature development (2013-2017) showed the stabilization of the program as twelve research nursing positions have been assigned to different major clinical departments of the institution. This stabilization was an indication of the limits of institutional capacity, as well as maturation of programs, where the focus was no longer on maximizing growth but on making programs of good quality and on increased productivity. The current number of positions supported flexible resources during this period focusing on professional improvement and development of the system and perfection of results instead of further expansion. This much more mature step showed the possibility of research nursing programs to reach the sustainable scale without compromising the quality standards and occupational job satisfaction.

3.2 Concepts like productivity analysis and performance

The exhaustive research nursing productivity analysis indicated outstanding performance enhancement that was out of the norm of experimental organizational development. The baseline measure of 8.56-fold gain in productivity during the final two years of analysis denoted extraordinary growth that qualified as a blend of both personal professional growth and systematic program advances. This impressive increase in productivity was spread over a wide range of activity sectors, suggesting neither gradual refinement of a few functions nor intensified focus on a within-country issue. This magnitude of improvement indicated that research nursing programs can create positive feedback loops, thus initially capital investments in the training and infrastructure can enable more and more sophisticated contributions.

Database development and maintenance processes also demonstrated strong growth trends, as research nurses developed and managed data systems that became increasingly complex in order to support multiple research studies at the same time. The shift in the use of complex database architecture and management that resulted in simple data collecting activities displayed a great level of professional growth in research nursing personnel. The integration of external databases with XUSD platform functions created a holistic data management environment

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that not only expanded institutional research infrastructure but also offered the research nurses, a valuable new technical skill-set as well as the potential aptitude and career development outlets.

Nurse activities in patient management increased exponentially in volume and complexity with research nurses now taking on much of the responsibilities of patient recruitment strategies, consenting, and longitudinal follow-up coordinating. The introduction of proscribed patient management regimes allowed research operations to be conducted in a more effective and efficient manor whilst providing quality assurances across other studies and departments. Combining patient management functions with the electronic health records systems streamlined the workflow process and eliminated administrative burden, and increased its data accuracy and completeness(8).

TABLE 2 Comprehensive Productivity Analysis by Domain (2015-2017)

Activity Domain	2015 Metrics	2016 Metrics	2017 Metrics	Growth Rate	Quality Indicators
Database Activities					
New XUSD® databases created	45	72	98	117.8%	98% accuracy rate
External database integrations	12	23	34	183.3%	95% completion rate
Data entry volumes (records)	15,400	28,900	42,600	176.6%	99.2% quality score
Database maintenance activities	180	245	324	80.0%	100% uptime
Patient Management					
Recruitment activities	890	1,240	1,680	88.8%	85% consent rate
Screening procedures	1,450	2,100	3,200	120.7%	92% eligibility accuracy
TCLE applications	2,340	3,200	4,580	95.7%	98% compliance rate
Follow-up coordinations	4,200	6,800	9,500	126.2%	94% completion rate
Scientific Output					
Manuscript contributions	24	38	52	116.7%	Impact factor: 3.2 avg
Conference presentations	18	29	41	127.8%	International: 60%
Educational activities	45	68	89	97.8%	Satisfaction: 4.8/5.0
Peer review activities	32	48	67	109.4%	Quality rating: 4.7/5.0

3.3 Science production and contribution to publications

Advances by research nurses in scientific output research showed significant increase in volume as well as quality in number of publication, presentations and educational activities. The tracking of research nursing input into manuscript preparation, conference presentations and peer review activities in a systematic way demonstrated the individual contribution to intellectual activity beyond the technical to analytical and interpretation roles. Research nurses have also published/co-published dozens of peer-reviewed articles, presented their work at local, regional, national and international conferences, and contributed to curricula of healthcare professionals and students.

The changes in research nursing functions over time, in which individuals became scientific contributors rather than data collectors, were also based on professional growth and institutional appreciation of nursing as a contributor to scientific success. Research nurses were not only involved in studies in terms of discussions with the design, analysis of data, and formulation of a manuscript, but also brought in their clinical knowledge and methodology practices that improved the quality and pertinence of the studies. This increased participation in scholarly efforts created opportunities to develop as a professional as well as enhancing research efforts by including nursing input and clinical knowledge(9).

The international scope of research nursing input was also felt more in the various multicentered researches done, international research networks and global research professionals associations. studies with institutions in Brazil

and abroad Research nurses helped the home institution gain credibility as an effective partner in world research. This global engagement allowed professional growth and strengthened reputation and collaboration possibilities of the institution.

3.4 Integration of Technologies and System Development

The productive and successful culmination of the XUSD 1 and the XUSD 2 data management systems were a major technological accomplishment that resulted in a productivity improvement of the research nursing team and the creation of institutional capabilities in preparation to the future of increased research. This comprehensive tracking functionality helped the platform analyze research nursing contributions in great detail, decrease the workload on both the administration and staff and increase the accuracy of the received data. The seamless nature of the workflow processes due to the integration of the system with existing institutional information systems ensured efficiency of workflow processes through maintenance of the data security and privacy standards.

Automated reporting capabilities in the XUSD platform led to a real-time tracking of research nursing activities and even a valuable feedback to decisions regarding performance improvement especially process improvement and use of a resource base. The monthly and annual reports produced by the system objectively documented the research nursing contributions that formed basis of performance evaluation, career development plan, and institutional strategic plan. The thoroughness of these reports allowed defining trends, patterns, and there were possibilities of further improvement(10).

The ability of the platform to be future-proof and changeable showed its potential to be extended to other research campaigns and other new, emerging technologies. The design of the system never compromised performance and reliability with growing data volumes and the increasing number of users and their needs to expand functional features. This scalability gave the confidence in the capability of the platform to grow as the institutions might grow and hold high standards about data quality and system performance.

4. Conclusion and Future work

The multifactorial insight into the development of research nurses inside the cancer center offers strong arguments to the potential disruptive capability of nursing experts and how their specialized role can drive the institution research capacity and personal growth. The gradual transformation of informally arranged research support to formal research nursing roles is an indication that institutions are capable of establishing lasting careers by integrating nursing skillset and taking care of their institutional demands. The transformation is far reaching past mere job creation, however, and includes shifts in institutional culture around research, in patterns of interdisciplinary collaboration, and in both the work outcomes and outputs of scientific productivity that bring benefit to various stakeholders, including patients, healthcare professionals, researchers and the scientific community as a whole.

The historic development path of two informally trained nursing research support professionals in 2001 to a dozen of recognized research nurses in 2017 is not all a quantitative increase; there is a qualitative shift in the types of nursing professional knowledge that can contribute to scientific progress. This development shows that research nursing roles can be stepping stones towards research institutionalization which can give rise to infrastructure development of research, quality standards and also develop collaborative relationships that can benefit various research projects at a time. This trend of sustained growth, in conjunction with measured and documented increases in productivity and scientific output value, is highly conclusive about the viability and benefit of an investment into specialized research nursing programs as a component of healthcare departments.

The description of the integration of research nursing action and institutional strategic goals serves to explain how the personal and professional development of employees can be linked to organizational requirements, resulting in a win-win mutually beneficial agreement, which promotes individual career gratification as well as institutional. Research nurses have created high-level skills in the domains of database management, regulatory compliance, bioethics and scientific communication, and have played a direct role in institutional research productivity, scientific profile, and collaborative possibilities. The compatibility of individual development and the institutional gain implies that research nursing programs are long-term strategies in workforce development that are flexible to changing healthcare and changing research needs.

The results of this longitudinal study would be of great importance to health-related institutions that aim to improve on their research facilities as well as offering viable career-building experiences to the nursing professionals. The experience of Brazil illustrates that it is possible to effectively develop and maintain research nurse programs even

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in a resource-limited setting when institutional commitment is evident, there is a methodical approach to program development, and emphasis is placed on both near-term productivity and long-term strategic planning. These understandings are especially pertinent to healthcare establishments in underserved societies or resource-constrained environments where creative strategies of capacity building would be necessary to construct research program development.

Whether these research nursing models can be scaled across institutional settings is an important factor to be considered in relation to large-scale application of the models. Certain implementation mechanisms may have to be adjusted to local regulatory frameworks, cultural conditions and resource availability, but the basic principles of an effective research nursing program are seemingly applicable across healthcare facilities. The identification of core competencies, core infrastructure needs and critical success factors allows the other institutions to learn what works and changes specific approaches based on their situation and intended outcomes.

The fact that positive return on investment could be observed during the research nursing positions demonstration is an important testimony to the institutional decision-makers considering the similar program development. The reported productivity gain, research output gain, as well as operations efficiency of research nursing programs suggests that these jobs can create value that extends beyond the direct labor costs of these positions in terms of better research quality, increased compliance, collaborative potential, and institute/organizational reputation. This body of evidence can be used to advocate the development of research nursing programs and serves as a benchmark to measure performance and continue the data refinement process.

The research nursing career pathway is a marked improvement in the development of the nursing profession by offering a possibility of a specific practice that allows maintaining a focus on the patient at the same time working on scientific progress. The observed career mobility of the research nurses in the program shows that the position can offer satisfying career opportunities to talented and motivated nursing professionals on a repetitive basis. The acquisition of specialized research competencies in research methodology, data management, regulatory compliance and scientific communication, in addition, provides research facilities with needed skills that augment their capability as well as people individually.

The institutionalization of the research nursing roles through incorporation into the general nursing education and professional development programs has significant implications to the nursing schools, continuing education programs and professional organizations. The fact that research nursing faculty and students have achieved such success in developing effective research nursing programs should encourage the nursing academic community to develop and include more education about research methodology, data management, and scientific communication skills in the curricula so that all graduates can have many career opportunities. Professional organizations can foster future of research nursing with specific certification programs, annual education and professional development, and networking available to assist in professional recognition and future career advancement opportunities.

International collaborating and recognition opportunities offered by the research nursing roles show the possibility of helping these positions to lead to the overall international improvement of nursing professional development and international healthcare improvement projects. Research nurses who volunteer in international research studies, professional exchanges, reciprocal researches and other research programs act as ambassadors to nursing expertise as they play a significant role in improving health statuses across the globe. The global aspect of research nursing practice implies that any investment in these initiatives can bring about results that go way beyond institutional scope to such areas as international health and scientific progress.

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Conflicts of interest

The authors have no conflicts of interest to declare

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