

International surgery: definition, principles and Canadian practice

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This article is dedicated to the Canadian international surgeon, Norman Bethune (1890–1939). International surgery is defined as a humanitarian branch of medicine concerned with the treatment of bodily injuries or disorders by incision or manipulations, emphasizing cooperation and understanding among nations and involving education, research, development and advocacy. In this article I review the colonial past, the dark ages following the Declaration of Alma-Ata, the progress made and the present challenges in international surgery. I present a definition of international surgery that recognizes the current era of surgical humanitarianism, validates a global understanding of surgical issues and promotes cooperation among nations. Included are the principles of international surgery: education, research, infrastructure development and advocacy. International surgical projects are classified according to type (clinical, relief, developmental) and integration strategy (vertical or horizontal). Also reviewed are the Canadian practice of international surgery by nongovernmental, professional and academic organizations and the requirements of international and Canadian funding agencies, the development concepts basic to all projects, including results-based management and the cross-cutting themes of gender equity, environmental protection and human safety. I recommend formalizing international surgery into a discipline as a means of promoting surgical care in low-income countries. If international surgery is to be sustained in Canada, infrastructure and support from Canadian surgeons is particularly important. An understanding of the history, definition and classification of international surgery should promote surgical care in low-income countries.

Cet article est dédié à Norman Bethune (1890–1939), chirurgien international canadien. On entend par chirurgie internationale une discipline humanitaire de la médecine qui s'intéresse au traitement des troubles ou des traumatismes corporels par incision ou manipulation, qui met l'accent sur la coopération et la compréhension entre les pays et qui met à contribution l'éducation, la recherche, le développement et la représentation. Dans cet article, je passe en revue le passé colonial, l'époque sombre qui a suivi la Déclaration d'Alma-Ata, les progrès réalisés et les défis actuels de la chirurgie internationale. Je présente une définition de la chirurgie internationale qui reconnaît l'ère d'humanitarisme chirurgical en cours, valide une compréhension mondiale des enjeux chirurgicaux et préconise la coopération entre les pays. On y trouve les principes de la chirurgie internationale : éducation, recherche, développement d'infrastructures et représentation. Les projets de chirurgie internationale sont classés en fonction du type (soins cliniques, secours, développement) et de la stratégie d'intégration (verticale ou horizontale). Nous passons aussi en revue la pratique canadienne de la chirurgie internationale par des organisations non gouvernementales, professionnelles et universitaires, ainsi que les besoins d'organismes subventionnaires internationaux et canadiens, les concepts du développement qui sont à la base de tous les projets, y compris la gestion axée sur les résultats et les thèmes transcendants que constituent l'équité entre les sexes, la protection de l'environnement et la sécurité de l'être humain. Je recommande de structurer la chirurgie internationale en une discipline qui permettra de promouvoir les soins chirurgicaux dans les pays à faible revenu. Si l'on veut que la chirurgie internationale soit viable au Canada, l'infrastructure et l'appui des chirurgiens du Canada sont particulièrement importants. Une compréhension de l'histoire, de la définition et de la classification de la chirurgie internationale devrait promouvoir les soins chirurgicaux dans les pays à faible revenu.

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This review is dedicated to Norman Bethune (Fig. 1) the Canadian international surgeon. It in-

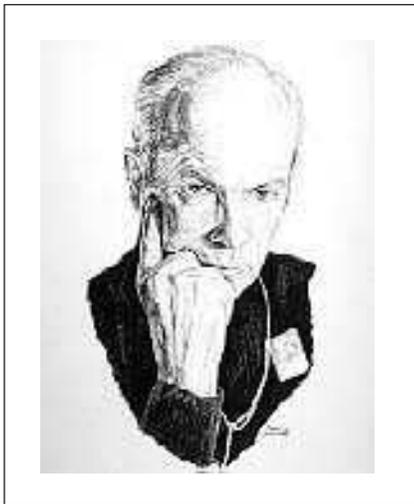


FIG. 1. Dr. Norman Bethune, international surgeon (1890-1939). Portrait by Irma Coucill. © The Canadian Medical Hall of Fame

cludes a commentary on the history of international surgery, proposes its definition and clarifies its principles. Subsequently, basic concepts of development, the Canadian practice of international surgery and the requirements of Canadian donors are reviewed. The future of international surgery within the Canadian context is discussed.

In 1938, in a letter to Frances, the woman he married and divorced twice, Bethune wrote: "I refuse to live in a world that spawns murder and corruption without raising my hand against them. I refuse to condone, by passivity, or by default, the wars which greedy men make.... I am going to China because that is where I feel the need is greatest; that is where I can be most useful."¹ Months later, Norman Bethune died in China from surgically acquired bacterial septicemia. His egalitarian vision and unwillingness to accept the status quo resulted in a short, rich and controversial life² that has only in retrospect been acknowledged as an accomplished one.³ Bethune supported medicare for

Canada, advocated for the early surgical management of tuberculosis, developed innovative instruments for thoracic surgery, introduced mobile blood transfusion units in the Spanish Civil War and initiated surgical education for technicians during the Chinese Revolution.⁴⁻⁷

Another Canadian international surgeon, Lucille Teasdale, practised in Uganda and, like Bethune, died of a surgically acquired infection, in her case human immunodeficiency virus (HIV)⁸ (Fig. 2). She had an aversion to injustice, whether in Montréal or Africa, and was also iconoclastic; Dr. Teasdale was obliged to obtain surgi-



FIG. 2. Dr. Lucille Teasdale (1929-1996). Portrait by Irma Coucill. © The Canadian Medical Hall of Fame

cal training in Europe to overcome the North American gender barrier during the early 1960s. She established St. Mary's Hospital Lacor, which continues to this day as a centre of surgical excellence in northern Uganda.⁹ Many other Canadian surgeons have made contributions internationally but remain unknown except to patients and families.

History of international surgery

To understand the present era of international surgery, it is important to understand its history. International surgery began in the colonial

era linked to the European conquest of the southern hemisphere (the south). Surgery in the colonial era included military surgery, where the surgeon was part of a war machine, and missionary surgery, where the surgeon's role was secondary to evangelism.¹⁰ During much of the 20th century, exotic diseases and their distribution between the tropics of Cancer and Capricorn were emphasized and referred to as tropical surgery.¹¹ In the second half of that century, international surgery was also characterized by dramatic examples of inappropriate use of technology, such as the flying doctors and floating hospitals. This provided good television, effective fundraising but limited patient care.^{12,13} Although many during the colonial era were highly dedicated surgeons and made contributions, sometimes at great personal cost, the legacy of the colonial era was unsustainable surgical services that were ineffective in addressing the needs of populations. The lack of sustainability and the inefficiency of the colonial era together with examples of elitism and discrimination brought international surgery into disrepute.

The "Dark Ages" of international surgery followed the colonial era. The landmark for the initiation of this bleak era was the 1978 Declaration of Alma-Ata.¹⁴ This declaration, which called for "health for all by the year 2000," failed in its objective. One of the reasons for this failure was that the declaration was inappropriately used to undermine the importance of clinical care, particularly surgical care. The World Health Organization (WHO) slogan would have been more accurately stated "health for all, but surgery for none."¹⁵ During this post-colonial era, international funding for clinical work and hospitals was markedly reduced, and surgical care was neglected.

When the misunderstandings of the dark era ended, the present era was introduced, not by surgeons but by economists from the World Bank with the publication of the World

Development Report of 1993.¹⁶ This report noted that investing in health was an important development strategy and that essential clinical care, including surgery and obstetrics, was economically necessary for low-income countries and therefore should be funded. Unfortunately, the impact of the colonial era together with the subsequent neglect of clinical care is such that the majority of the global population does not have access to even essential surgical care.¹⁷

The present era of international surgery is characterized by positive changes that are a response to the limitations of the past. The inadequacies of surgical care for most of the world's population are now being addressed, but the responses are still far from complete. In this new era, surgical disorders that are important in low-income countries of the south are now recognized as similar and in many cases the same as those of the high-income countries of the northern hemisphere (the north). Disease knows no geographic boundaries; thus, there is no such thing as tropical surgery. Surgeons are trained in low-income countries, mission hospitals are nationally owned, war surgery is done by noncombatants, and surgeons are involved in peace building, both through direct activities and as a bridge to peace.¹⁸ Cost-effectiveness is assessed, with the priority given to effective treatment of disorders suffered by the majority of the population. The present era has the opportunity to change the past; however, the challenges of reduced resources, expanding populations, acquired immunodeficiency syndrome (AIDS) and trauma pandemics that disproportionately affect the south, will only be surmounted if there is a commitment to quality surgical care.¹⁹

International surgery: definition core sense

Since the establishment of the Canadian Network for International Surgery (CNIS) in 1995,²⁰ the term

international surgery has been used at the University of Toronto, where the Office of International Surgery is established, and at the University of British Columbia, where the Branch for International Surgery has been initiated. But what is international surgery?

The concepts within the definitions of surgery, international, internationalism and humanitarianism are part of what is recognized as international surgery and contribute to its definition.²¹ The Oxford dictionary definition of surgery emphasizes that it is the branch of medicine concerned with the treatment of bodily injuries or disorders by incision or manipulation. This dictionary definition although correct, is narrow, as surgical care involves more than operating. The adjective international includes the notion of many nations and people in many nations. Within the concept of many nations it would be reasonable to note that the majority of nations are of low income. A surgical activity that involves 2 or more high-income countries ignores much of the world's population and is not truly international. The noun internationalism brings in the concepts of advocacy and understanding that are not included in the adjective, international. The intent of international surgery is humanitarian as implied by internationalism, but inclusion of the promotion of human welfare in the definition should be explicit. Humanitarianism therefore would exclude scientific exchanges or military surgery²² that does not have human welfare as a primary objective.

A proposed dictionary definition for international surgery, based on the foregoing ideas, is as follows:

international surgery *n.* a humanitarian branch of medicine concerned with the treatment of bodily injuries or disorders by incision or manipulations that includes cooperation and understanding between nations • involving education, research, development and advocacy.

The core sense of the preceding definition recognizes the present era of surgical humanitarianism, validates a global understanding of surgical issues, promotes cooperation and understanding and facilitates the formalization of international surgery as a discipline.

Principles of international surgery: definition sub-sense

The sub-sense of the preceding definition includes the principles of international surgery education — research, development and advocacy — that should be understood within the context of international humanitarianism.

The principles that distinguish international surgery from other types of surgical practice were debated in 2002 at meetings in Africa and Canada and are discussed; examples from the CNIS activities are presented to assure the reader that these principles are not just theoretical.²⁰

Education

The basis of all sustainable surgical development is education, and the structure for educational reform is curriculum. The sustained impact of education depends not just on the clinical knowledge and behaviours attained by learners but also on empathy for the underprivileged. Curriculum should meet national needs, be designed within a structure that allows its content to be responsive to change but at the same time maintain its intent.²³ A curriculum is a substantive product that has the potential to continue meeting objectives long after a project's completion.

The CNIS, with the collaboration of many African partners, has developed 3 curricula for health professionals. The Essential Surgical Skills (ESS) curriculum teaches management and technical skills, using simulators and animal material, to primary care providers. The Trauma Team Training course is one de-

signed to create teams for the care of injured people in under-resourced emergency departments in Africa.²⁴ The Injury Epidemiology for Africa course educates professionals of different relevant disciplines in injury epidemiology. Once a curriculum has been established it is important to create the capacity to use the material through the training of teachers. African specialists are qualified to teach all of these curricula.

Surgeons from the north must realize that educational programs require resources that are often lacking at institutions in the south. In the case of the ESS course, surgical instruments are needed to teach technique. Resources must be provided from the north, but ownership of teaching and surgical equipment should be immediately transferred to the institutions in the south. This promotes trust and acknowledges joint responsibility for project success.

Scholarships that are tenable within low-income countries are not expensive and are an opportunity to introduce young minds to new ideas. The CNIS has annual injury research scholarships for Ugandan and Canadian undergraduate students to study at the Injury Control Centre, Uganda (ICC-U). Scholarships that are tenable in the north, although sometimes necessary, promote emigration that undermines southern capacity.²⁵

Research

If education is the basis of international surgery, that education must be evidence based, and the information generated from research should be communicated. Therefore, the second principle activity of international surgery is research.²⁶ Research is often neglected when surgical care is inadequate or the number of patients large, but the resolution of the underlying problems will require both operational evaluation and academic research. The neglect of the research of surgical disorders and surgical service contributes to inadequate

clinical care. Injury accounts for more than 5 million deaths annually, a number similar to the total of AIDS, tuberculosis and malaria combined.²⁷ Injury, which is a surgical public health problem, urgently requires further understanding. Obstetrics also requires more research. Five percent of women in sub-Saharan Africa will die of complications of pregnancy; therefore, the reversal of this terrible situation warrants investigation.

Research in international surgery can be operational or academic.²⁸⁻³⁰ Operational research includes the evaluation of project activities and the preparation of reports, not just for funders but as part of feedback to the community where the project was conducted. Academic research and its publication is important. This activity includes publication in peer-reviewed journals and the preparation of theses in postgraduate programs. The CNIS has linked the *Canadian Journal of Surgery (CJS)* to the *East and Central African Journal of Surgery (ECAJS)*. The objective is for the journal from the north to promote surgical research regionally and to help the *ECAJS* gain international recognition.³¹ The research should advance the careers of surgeons from both north and south. If academic advance is equitable, a constructive collaboration develops, but a destructive outcome occurs if there is exploitation of the southern colleague by the economically advantaged northern academic.

Obstacles to research relevant to international surgery are numerous.³² One is that the individual surgeon must set research as a personal priority and make the necessary time commitment. The resources in the south are limited; however, the disadvantage that the lack of funds presents may be countered by lower costs. Academics from the south have even more competing interests than their northern counterparts, making the constraints of human resources as important as financial ones. Injury research in conflict

zones has the added problem of personal security. Research in remote areas may be impeded by distance and poor roads, making logistics complicated and uncomfortable. Language is an issue, as many southern countries have hundreds of languages any one of which may be needed to function at the community level. University linguistic departments are often not a good resource for translation as academic vocabulary is out of the reach of the average villager.

Another problem is that northern publications may be biased against research from low-income countries. The publication of new descriptive and analytical studies from the south, where the majority of the global populations live, should have priority as this information is more important than that found in many overly specialized papers from the north.

Infrastructure development

The international surgeon must be prepared to understand health care systems and be involved with infrastructure development. The infrastructure necessary for any international health project includes educational, health care and research institutions. To implement the priorities of international surgery, functional infrastructure within the health care system is required. Complex systems involve many people and the necessary elements in a system do not improve without a clear agenda.³³

The first choice for the surgeon from the north should be to participate in strengthening existing southern institutions. This approach is efficient, cost-effective and ethical. If a southern institution for a particular function does not exist, creation is warranted. The advantages of strengthening or establishing southern institutions is the commitment associated with national ownership, which has funding advantages as many international donors can be approached rather than depending on the original foreign funding agency,

and the resulting institution is a sustainable product that does not depend on expatriate funding or staff. Northern infrastructure in the south does work; however, in the long term, this external infrastructure is inefficient, expensive and unsustainable.

CNIS activity includes strengthening the teaching programs of African university departments of surgery. The ESS program has been integrated into the curriculum of 7 departments. The approach of strengthening infrastructure used by the CNIS in most of its projects is effective because the contributions add value to long-standing African success rather than starting parallel structures.

Examples of infrastructure creation in Africa with the support of the CNIS include the establishment of the ICC-U, which was registered as a nongovernmental organization in 1999, the Injury Prevention Initiative for Africa, which was registered in 2002, and the African and Canadian Committee for Essential Surgical Skills, which entered a process of linkage with the College of Surgeons of East, Central and Southern Africa in 2002 and 2003.^{18,24,34}

Infrastructure development should not be restricted to the south. If the surgeons from the north, Canada in particular, are to be effective, Canadian infrastructure is needed. That was one reason why the CNIS was founded.^{15,20} For similar reasons, the Canadian Association of General Surgeons has established the Committee for the Advancement of Surgical Services in the Developing World,³⁵ the University of Toronto has an Office of International Surgery, and the University of British Columbia established its Branch for International Surgery. Canadian nongovernmental, professional and academic surgical organizations all have contributions to make internationally, and it is important that they continue to do so in harmony.

Advocacy

Advocacy is a key issue in international surgery, otherwise issues relevant to the discipline will continue to be neglected. Of importance is the lack of knowledge of both health ministries and international funding agencies. The Ministry of Health of Uganda named injury as a top 10 health priority because the surgeons at the ICC-U generated data showing the severity of the problem and advocated for a response. The Canadian International Development Agency (CIDA) Action Plan on Health and Nutrition recognizes the injury pandemic because of the advocacy of the Office of International Surgery and the CNIS. Without this recognition, funding in future proposals for injury control would not be forthcoming.²⁸

Canadian practice of international surgery

Canadian surgeons who wish to practise international surgery should understand the different approaches to project implementation, the expectation of Canadian funding agencies and the opportunities available.

Surgical project classification

Surgical projects are classified according to type and management strategy. The purpose of classification is not to recommend one project class over another but to promote awareness that surgery projects are not uniform, address different needs and have different requirements.

There are 3 types of surgical projects: clinical, relief and developmen-

tal (Table 1). The objective of clinical projects is to provide direct surgical care; examples would include plastic³⁶ or ophthalmic¹³ surgery projects and mission hospitals.³⁷ Relief projects include surgical teams responding to needs that result from war or natural disaster or the establishment of a hospital in a failed state. The objective in relief projects is to alleviate a time-limited crisis. Developmental projects include surgical education and public health projects that address a surgical disorder such as injury. The objective in this type of project is to create or augment local capacity to address the burden of surgical disorders.

Surgical projects use either a horizontal or vertical management strategy³⁸ (Table 1). Horizontal integration of a medical project implies that the management is at a single stage of the hierarchy within the health care system. It combines and coordinates medical, administrative and organizations services at the same level of care. An example of a horizontal activity would be different disciplines working together in preventive health care all at the local level in a single rural district. In vertical integration, activities of the project are managed and policy set at the top of the hierarchy with control descending through subsequent management levels,³⁹ for example, a vaccination campaign in a rural district with the local management team directed by administrators or policy from the ministry of health. In development projects, horizontal integration would occur in the south whereas a vertical integration could be managed from the north or perhaps the national capital in the north.

Table 1

Classification Matrix for Surgical Projects in International Surgery

Strategy	Type of project		
	Clinical	Relief	Development
Vertical integration	Cleft lip project	Earthquake surgery	Surgical education
Horizontal integration	Mission hospital	Hospital in failed state	Injury control

Surgical projects are classified by 1 cell in Table 1, defined by the type of activity (column) and the management strategy (row). A cleft lip project,²³ where surgeons come from the north and perform a series of procedures in the south, is a clinical project using a vertical management strategy, whereas the mission hospital⁴⁰ providing surgical service together with medical and obstetrical activity is a clinical project with a horizontal strategy. A surgical relief project where a team is organized in the north and sent to a war zone in the south is using a vertical strategy.⁴¹ The establishment of a general hospital in a failed state is a relief project that uses a horizontal strategy.⁴² Development projects, like the establishment of a surgical curriculum, if planned in the north and implemented in the south are being implemented vertically, whereas an injury control project that requires numerous activities from several disciplines at the same level uses a horizontal strategy. Of the 3 types, development projects are the most sustainable, and the management strategy that best promotes sustainability is horizontal. Sustainability is not the objective of relief projects, therefore a vertical strategy is appropriate. The best type and management strategy for a specific project varies according to the need being addressed; thus, forethought into the best class of project is warranted. The CNIS checklist, which evaluates 5 domains to determine the quality of a surgical development project, has been published previously.²⁰ The checklist is recommended to the reader who wishes to predict the chances of success of a specific surgical project.

Basic development project concepts

Results-based management⁴³

International projects require responsible management, and the current recommendation of the CIDA

in this regard is results-based management. Projects need to have a goal that will ultimately have a positive impact. Results-based management is accomplished through activities that have measurable outputs and outcomes. Output is best evaluated using predetermined quantitative indicators, whereas outcome is determined both quantitatively and qualitatively. In the case of a clinical surgery project, the activity is surgical procedures and the output is the number of surgical procedures performed. The outcome includes mortality, morbidity and assessments of patient function and quality of life. The goal in a clinical surgery project might be to alleviate a specific surgical disease or introduce an operative procedure and the impact evaluation would determine if that goal was achieved. Thus, results-based management is conceptualized as a sequential chain: goal? activities? output? outcome? impact. Funders expect that proposals will include this management sequence with indicators that clearly assess project success.

Surgeons tend to be good at activity and output but less disciplined about formulating goals, and determining outcomes and impacts. Activity and output are insufficient to determine a project's success. There have been too many international surgical projects with high output but poor outcome. If the impact is to change the incidence or prevalence of a surgical disease, the project goal will reflect that intent with activities that are designed accordingly, and the outcome and impact are more likely to be positive.

"Cross-cutting" development themes

To obtain financial support for international projects from most funding agencies, 2 cross-cutting themes must be addressed. Cross-cutting themes are issues addressed irrespective of the primary project objective. The required themes are gender equity⁴⁴ and environmental impact.⁴⁵

A third cross-cutting development theme that should be addressed is human safety.

Gender equity is an issue of importance, not just because it is a funding requirement but because there is a clear link between successful development and gender equity. Surgery is a discipline in which women have not received equal opportunity. Surgical projects should assure equal opportunity for women in participation and leadership. In countries where women are markedly under-represented, affirmative action will be necessary. Gender issues of specific surgical interest internationally include access to safe delivery including cesarean section,⁴⁶ prevention of domestic violence⁴⁷ and the treatment and prevention of female genital mutilation.⁴⁸

The environmental impact is assessed in surgical projects when construction of buildings or roads is part of a project. A specific environmental issue for surgery is the biological hazard involved in the disposal of human waste, needles and sharp instruments.⁴⁹

Safety is a cross-cutting issue that should be recognized by Canadian and international funding agencies but to date has been ignored. The issue of personal security for participants in international surgical projects requires assessment by project directors. Project participants should not be allowed carelessly to put themselves in danger. Project directors should exclude without hesitation the participation of individuals who disregard the need for personal security, as these people (often from the north) do not have the right to jeopardize colleagues and support staff (often from the south) or to undermine long-term program objectives. It would be coherent if international surgeons aligned themselves with other professionals and advocacy groups who promote safety as a human right.⁵⁰

A priority to identify injury risk

caused by large infrastructure projects is necessary. Injury risk is high in low-income countries, and the surgeon is well placed to evaluate this risk. Highways are assessed for their impact on endangered plants or animals but not for their effect on childhood injury or community safety. Hydroelectric projects are constructed without regard to the danger of drowning that results from the creation of a reservoir. Advocacy on the part of surgeons is recommended to make the long-term assessment of safety a part of all major capital development projects, in particular those implemented with international financing.

Opportunities present and future for Canadians to practise international surgery

The opportunities for Canadian surgeons to participate in international surgery exist through non-governmental organizations like the CNIS,⁵¹ or Orthopaedics Overseas, international organizations like the International Committee of the Red Cross, academically-based organizations such as the Office for International Surgery at the University of Toronto⁵² or the Branch for International Surgery at the University of British Columbia and professional organizations like the Canadian Association of General Surgeons.⁵³ Other opportunities include projects facilitated by Rotary International⁵⁴ and the CNIS, both of which assist members to implement well-designed projects. Independent individual efforts are discouraged as it is difficult for a single individual to sustain a development project that will have impact.

Canadian surgeons, obstetricians, anesthetists and emergency physicians are encouraged to join the CNIS as it is the only umbrella organization for international surgery in Canada. All surgeons including CNIS members are encouraged to support subspecialty nongovernmental organizations,

departmental activities and professional committees dedicated to international surgery. Academic departments of surgery should review their mandate and consider the formation of units dedicated to true international activity.

Not all surgeons or surgical departments can or should participate directly in international surgery, but financial and personal support for surgeons who do work internationally is an important contribution that is open to all. Surgeons in Canada are a highly privileged group and have the resources to contribute meaningful sums of money to international activities. Unlike other surgical disciplines that have long histories and established clinical, educational and research resources, international surgery will require new money. Funded chairs for international surgery would be a means of long-term sustainability of international surgery in Canadian surgical departments and an innovative new source of funding for surgical departments that require growth in these days of economic constraint. The departments that choose to support international surgery will be able to credibly claim international status and will have financial investments regained in the intermediate term.

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