

Needs, Gaps and Opportunities for Infectious Disease Research in British Columbia

A Perspective from Population and Public Health

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ABSTRACT

Background: A review of infectious disease research activity and capacity was performed in British Columbia and linked to a process for identifying needs, gaps and opportunities from a public health perspective.

Methods: The study was organized in three phases: an environmental scan to describe current research activity in BC; a consultation to identify needs, gaps and opportunities with those conducting research (key informants) and the end users of research results (stakeholders); and a prioritization of the research needs emerging from the consultation.

Results: Analysis and synthesis of the consultation data resulted in the identification of nine research themes, which were prioritized in the following order: efficacy and cost-benefit, disease patterns, emerging infectious disease, immunology and vaccines, disease-specific research, health promotion and communications, safe food and water, knowledge translation research and genomics. Six capacity-building themes were also identified: attraction and retention, education and training, collaboration and networks, funding, dissemination of findings, and public health input, surveillance, informatics and databases.

Interpretation: The findings were helpful in developing a multi-disciplinary, multi-level infectious disease research agenda linking researchers in universities, hospitals and public health institutions with practitioners and policy-makers in British Columbia's public health system. The approach is both feasible and important to undertake at the national level.

MeSH terms: Communicable diseases, emerging; biology; ecology; public health; research; prevention and control; immunization; epidemiology; health resources; costs and cost analysis, economics.

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Infectious disease research can be defined as the systematic investigation of the biology and ecology of infection in order to develop or contribute to generalizable knowledge. Much research activity is supported by investigator-initiated, competitive, peer-reviewed funding as well as by commercial sector interests. Periodically, it is beneficial to compare ongoing research activity with the needs of those who are confronting the clinical and epidemiological challenges posed by infectious diseases by asking the following questions: "What do we know?" and "What do we need to know?" The purpose of this study was to identify priorities for infectious disease research with the aim of informing a forward-looking public health research agenda for infectious disease and the infrastructure to support it. In developing a research agenda from the perspective of population and public health it was deemed important to fill gaps in the current research effort.

METHODS

The needs, gaps, and opportunities assessment (NGOA) was a systematic consultative process, using both qualitative and quantitative methods (see Figure 1).

Environmental scan

An environmental scan was performed to provide an overview of published research activity on infectious disease and to identify those conducting relevant research and end users of research.

Infectious disease research activity was identified from online sources, which included Pubmed, Embase, EBM (Evidence Based Medicine) Reviews, Proquest Digital Dissertations and the Canadian Intellectual Property Office Web site. Manual scans were conducted on hard-copy journals that were not adequately indexed electronically. (A detailed description of terms and approaches used in the literature review may be obtained from Appendix 1 of the final report for the Canadian Institutes of Health Research (CIHR) on this assessment, posted at http://www.cdc.ubc.ca/AboutUs/Reports_PDF/NGOA%20Report.pdf).

Key informants were defined as those involved in infectious disease research and those in a position to contribute to the study regarding the current status of and

capacity for research in BC. This group comprised scientists, physicians, informatics specialists and funding agency personnel. Most had a university affiliation, and very few had any major role in public health management of infectious disease problems.

Stakeholders included any individual, group or organization in a position of using research results in the field of infectious disease prevention and control. This category included medical health officers, public health nurses, environmental health officers, policy-makers and personnel from non-governmental organizations. A small subset of public health personnel listed as stakeholders participated in research activities for a proportion of their time.

The research team compiled lists of key informants and stakeholders known to them. Web sites were searched for faculty members at academic institutions, and regional health authority directories were searched to identify public health workers. Throughout the consultation and prioritization process, contacts were asked to identify additional people to contribute to the study. All nominees and participants in the study were added to the database.

Consultation

Structured key informant and stakeholder interviews were conducted by telephone during the summer of 2002. A representative sample of key informants and stakeholders was selected from the contact database to receive an e-mail invitation and participate in an interview. Each respondent was asked to identify additional people to contribute to the study. This iterative process resulted in three waves of invitations, ultimately reaching 141 contacts. All those in the database not contacted for interviews were subsequently invited to participate in the prioritization of the research themes emerging from the consultation.

Key informants were asked eight questions during a 45-minute, structured telephone interview. They were asked to discuss their involvement in current and planned research activities, infectious disease research needs and opportunities, capacity for infectious disease research in BC and strategies for addressing these needs. So that the fit with identified stakeholder needs could be assessed, the ques-

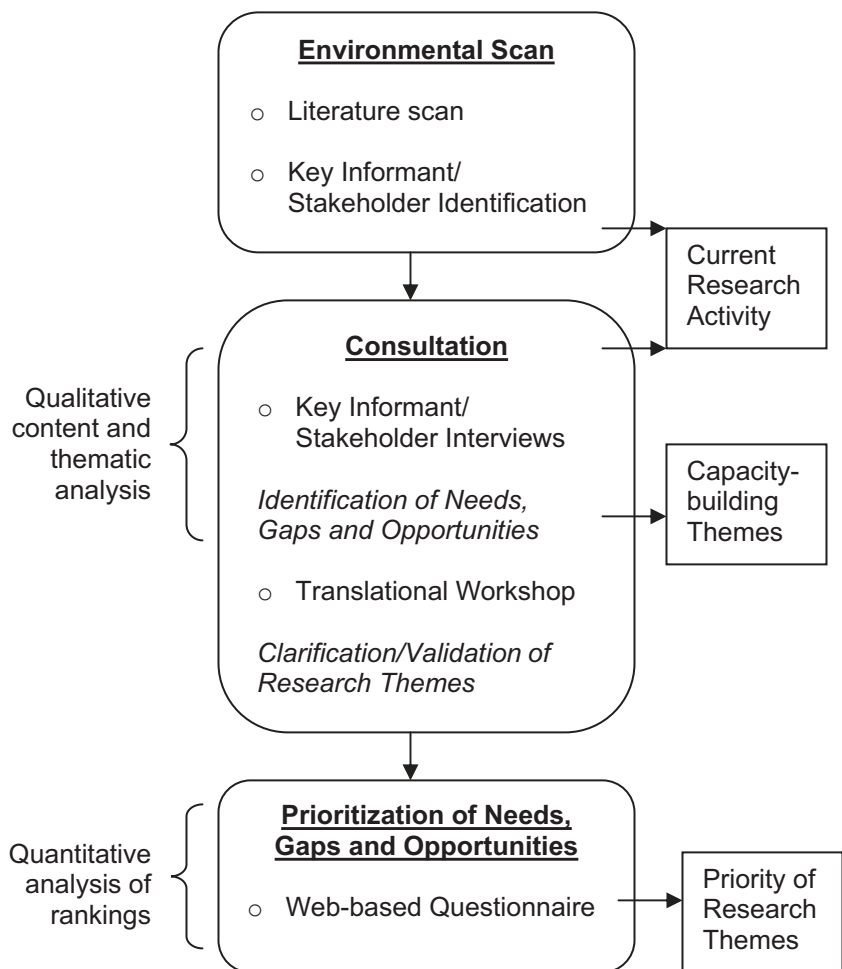


Figure 1. Overall design of the stages of the needs, gaps and opportunities assessment study

tioning addressed research activity broadly within the field of infectious diseases and was not confined only to pre-identified diseases of public health significance at that time.

Stakeholders were also asked eight questions, five of which were the same as those asked of the key informant group. The remaining questions were directed at their perspectives on significant issues or problems in the field of infectious disease pre-

vention and control work and on programs having the greatest impact on prevention and control of infectious diseases; as well, they were asked to rate public health research priorities in infectious disease in comparison with other health research priorities.

Fifty-three stakeholders and 46 key informants were interviewed. They represented a broad range of public health and research professions and areas of research

TABLE I

Distribution of Stakeholders and Key Informants by Discipline

Stakeholder Type	
Public health nurse	29.8%
Medical health officer	25.6%
Environmental health officer	14.4%
Policy-maker	12.4%
Non-governmental organization	4.2%
Other (consultant, First Nations, informatics)	13.6%
Key Informant Type	
Scientist	73.7%
Physician scientist	15.4%
Funding agency	7.3%
Informatics	3.6%

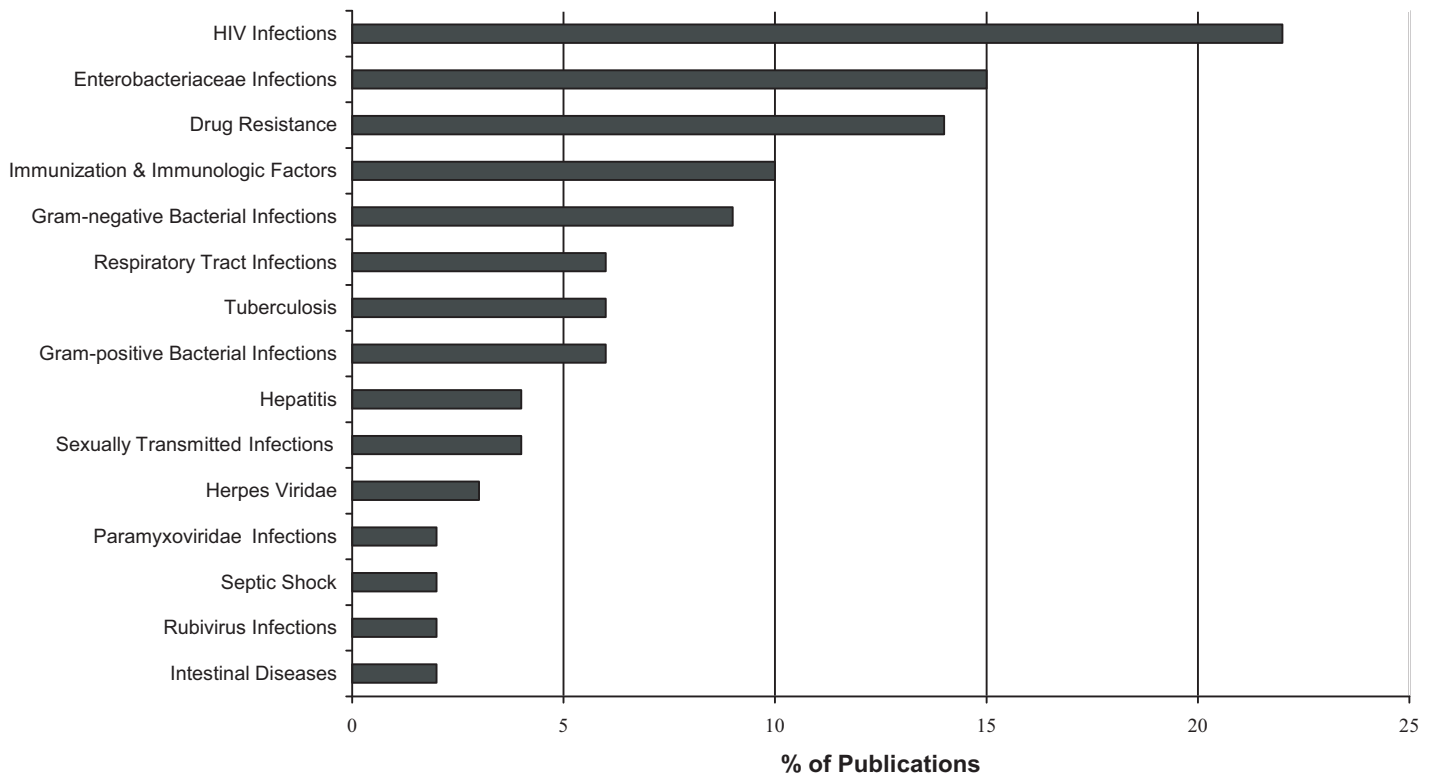


Figure 2. Fifteen most frequently published topics from British Columbia infectious disease researchers over the previous 5 years

and practice (Table I). The sample was geographically representative for stakeholders, but the key informant sample was heavily weighted to the Vancouver coastal region, as expected from the concentration of medical research at the University of British Columbia (UBC).

Data analysis

Field notes from the telephone interviews were transcribed and number coded for confidentiality. Transcripts were imported into QSR N6™ (QSR International Pty Ltd) for textual data analysis. Responses were rolled up by question and respondent type for thematic and content analysis. Transcript coding was done according to frequency of word/phrase responses. The key words/phrases were clustered with full text. The clusters were then reviewed for meaning and context.

Qualitative content analysis was conducted to elicit emerging categories that were identified to label the responses.¹ The initial round of analysis was reviewed by members of the research team for accuracy of the categories and relevance of the text, outlining of contextual information, the specific nature of the research needs and recommended strategies for capacity-

building. Eventually, key informant and stakeholder response categories were merged. In the end, the identification of emerging research themes and needs was the result of 10 rounds of analysis and synthesis.

Translational workshop

A translational workshop was designed as the second phase of the consultation process. The objectives were to validate and further clarify the nine research themes and to recommend appropriate research strategies and funding approaches to address them.

The translational workshop was attended by 49 people, 59% of whom were stakeholders; the remainder were key informants. The geographical representation of the translational workshop participants was consistent with that of the interview participants. However, there was greater representation by medical health officers and no representation by non-governmental organizations.

Prioritization of needs, gaps, and opportunities

The objective of this final phase was to develop a prioritized list of research themes arising from the consultation. A Web-

based prioritization exercise was completed in October 2002. All contacts in the database were invited by e-mail to participate in the prioritization exercise within a 2-week timeframe. Participants were first asked to rank the research themes in order of highest to lowest priority. Then, they were asked to rate each theme on the basis of 10 CIHR criteria for research using a 5-point Likert scale. Boxplots were generated for each theme. Themes were ordered by median rank, with ties being broken by the lower quartile.

Of the 563 database contacts invited to participate in the prioritization exercise, 185 submitted responses, 145 of which were sufficiently complete for analysis. Twenty-six percent of respondents were key informants. Each of the regional health authorities was well represented. In addition, there was representation by individuals outside of BC who were invited to participate in the Web-based prioritization exercise by other participants.

RESULTS

Published research activity

Of the published articles found, 480 met the inclusion criteria. HIV infections,

Enterobacteriaceae infections and drug resistance were the most represented research areas, representing over 50% of the reviewed articles (Figure 2). Most published research fell into the CIHR basic research category (44%), followed by health systems research (26%), clinical research (17%) and population health research (13%).

Reported research activity

Forty-six key informants reported involvement in 127 research projects spanning 42 subject areas. Hepatitis was the largest single research area, representing 11% of the research activity. The majority of reported research, representing over 40% of activities reported, was in the areas represented in Table II.

Rating of infectious disease research on the public health research agenda

Sixty-seven percent of stakeholders rated the current status of infectious disease research as of low or medium importance (low 25%, medium 42%, high 19%, don't know 13%). These ratings reflected stakeholder opinion that research on infectious disease prevention receives lower priority and less funding than research in the areas of acute and chronic disease treatment. These observations preceded the SARS (severe acute respiratory syndrome) outbreak.

Current context: infectious disease prevention and control practice in BC

Stakeholders reported that hepatitis C, sexually transmitted infections and pertussis have the most significant impact on their communicable and infectious disease public health practice in terms of workload and resources (Table III). Stakeholders emphasized a growing need to focus more on the determinants of health rather than on individual diseases. The interventions having the greatest impact on public health practice in infectious disease, as reported by stakeholders, are immunization, surveillance and disease follow-up, including contact tracing. Public education, care/treatment and prevention programs, food safety and safe drinking water programs were also identified. By comparing current research activities with the current context of public health practice the extent of the gaps and the limited match between the two become apparent (Table IV).

TABLE II

Most Common Current Research Areas of Key Informants

Reported Research Topic	% of Activities/Projects
Hepatitis	11.4%
Factors determining health	7.3%
Pathogens: interactions, bacterial	6.2%
Tuberculosis	5.8%
HIV infections	5.5%
Sexually transmitted infections	5.3%

TABLE III

Disease Areas Most Frequently Reported as Affecting the Practice of Infectious Disease Prevention and Control

Disease with the Greatest Impact	% of Stakeholders*
Hepatitis	51.9%
Sexually transmitted infections	35.2%
Pertussis	30.7%
Influenza	17.2%
HIV/AIDS	13.0%
Meningococcal meningitis	12.7%
Tuberculosis	12.1%

* Categories were not mutually exclusive, therefore percentage total does not equal 100%.

Identification of research themes

Analysis and synthesis of the interview data resulted in the identification of nine research themes. These themes represent what participants reported as opportunities for advancement in research on infectious disease prevention and control. What was anticipated was a list of research needs based on individual infectious diseases. What emerged was a multi-dimensional matrix of complex thematic areas.

The themes are presented in rank order as determined by the prioritization exercise. Shown in Figure 3 is the overall relative ranking and in Figure 4 the ranking based on a Likert scale for each of the 10 CIHR criteria. Both figures display similar results, although efficacy and cost-benefit research was ranked highest on the overall scale and disease patterns research was ranked highest on the CIHR scale. Emerging infectious disease research was seen as most likely to yield scientific advancement and genomics research most likely to be funded by CIHR, according to the CIHR scale. When stakeholder rankings were examined in isolation, they paralleled the overall results. However, key informants identified research on disease patterns as their top priority and, interestingly, ranked knowledge translation research as a higher priority than did stakeholders.

Participants also identified several capacity-building themes, including a need for more multi-disciplinary, multi-level research collaborations. In most cases, participants suggested that infectious disease research should be conducted collaboratively by universities, the BC Centre for Disease Control

(CDC), private-public partnerships and regional health authorities.

Theme 1: Efficacy and Cost-benefit Research

The need to define the evidence base for current infectious disease prevention and control practice at the population level was seen as very important. The results of such research would support optimal practice and provide a rationale for funding and policy decisions. Two major concerns of stakeholders were the inconsistency of implementation and practice across regions and the inconsistency of approaches to addressing infectious disease prevention problems across sectors.

Translational workshop participants suggested that universities, private-public partnerships and/or UBC CDC should collaborate with the regional health authorities to conduct this type of research using the following methodologies: collection of surveillance data, ecological studies, community intervention trials and regular, formal cost-benefit analysis of new programs.

Theme 2: Disease Patterns Research

Participants identified the need to study the links between infectious disease patterns and their upstream determinants in the physical and social environments. Examples of determinants included the effects of environmental and climate change, immigration and global travel, and globalization of economic markets. Participants suggested that the research could be most effectively accomplished by developing partnerships

TABLE IV

Comparison of Infectious Disease Issues and Activities Deemed Important by Stakeholders with Areas of Research Activities of Key Informants

Important Issues Facing Communicable and Infectious Disease Practitioners	Diseases and Interventions Having the Greatest Impact	Current Research Activity
Outbreaks Immunization Surveillance/reporting Follow-up/contact tracing Information/communication	Diseases Hepatitis Sexually transmitted infections Pertussis Intervention Immunization Surveillance Follow-up/contact tracing	Reported Hepatitis Factors determining health Pathogens: interactions, bacteria Published HIV Enterobacteriaceae Drug resistance

with international organizations (e.g., the World Health Organization), other countries and immigrant communities. Surveillance was the proposed methodology, incorporating contextual analysis, linked databases (including laboratory systems) and mathematical modeling.

Theme 3: Emerging Infectious Disease Research

A need was expressed to expand and coordinate the detection of and response to emerging infectious diseases at the provincial, federal and global levels. Proposed methodologies for this area of research included surveillance, epidemiology, microbiology, genomics and the develop-

ment of new diagnostic tests, therapeutics and vaccines. Participants emphasized the importance of a multi-disciplinary and multi-level approach and the need to involve front line health workers, public health laboratories, historians, sociologists, psychologists/risk managers and information system specialists.

Theme 4: Immunology and Vaccine Research

Immunization was identified as the foundation strategy for infectious disease prevention and control. The benefits of expanded knowledge in this area included increased acceptance of vaccines and reduced costs to the health care system.

Proposed methodologies consisted of basic science studies (e.g., using cell and animal models), clinical evaluative studies (e.g., vaccine trials), implementation research (e.g., cohort studies, qualitative research, vaccine promotion studies) and population-based immuno-epidemiological surveys.

Theme 5: Disease-specific Research

Participants emphasized the need to develop and apply objective criteria to prioritize which infectious diseases are chosen for research study and funding. Criteria should include measures of disease burden (mortality, disability adjusted life-years, quality adjusted life-years). Participants also suggested that research should be focused on specific target populations in order to close disparity gaps. Enhanced surveillance and epidemiological measures of disease burden were seen as key methodologies. Specific high-burden or high-profile infectious diseases/pathogens for study included chlamydia, syphilis, viral hepatitis, HIV, pertussis, tuberculosis, human T-lymphotropic virus, meningococcal disease, group A streptococci, malaria and vaccine preventable diseases.

Theme 6: Health Promotion and Communications Research

The value of expanded research in the area of health promotion was identified. This was seen as important with respect to immunization uptake, behavioral interventions and compliance with activities to control disease outbreaks. The notion was that research can mobilize societal participation and that this improves the uptake of new public health programs. Recommendations for specific methodologies included knowledge synthesis and analysis of best practices, action-oriented research that engages members of at-risk groups, and community-

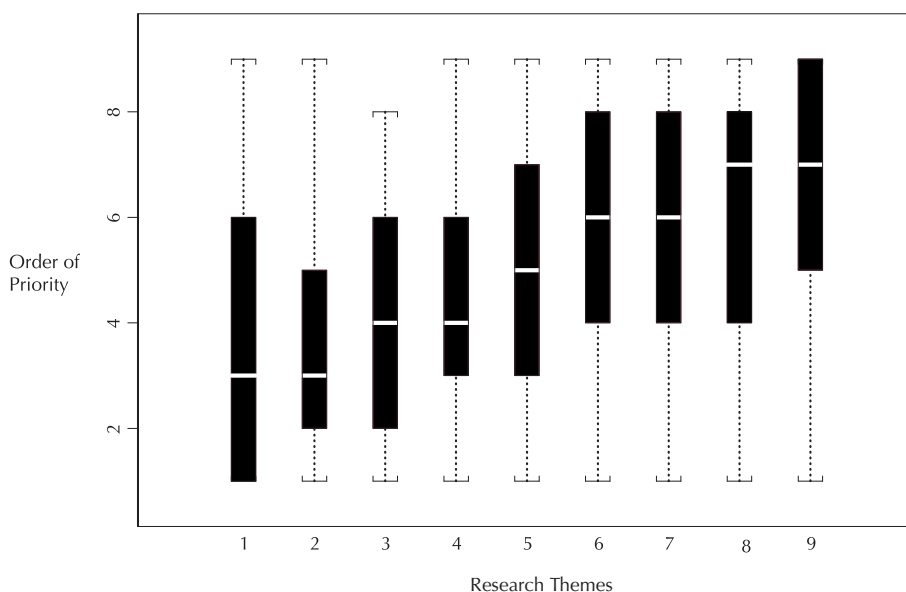


Figure 3. Relative ranking of the nine research themes that emerged from the consultation process

Research Theme

- | | |
|---|---|
| 1. Efficacy and cost-benefit research | 5. Disease-specific research |
| 2. Disease patterns research | 6. Health promotion & communications research |
| 3. Emerging infectious disease research | 7. Safe food and water research |
| 4. Immunology and vaccine research | 8. Knowledge translation research |
| | 9. Genomics research |

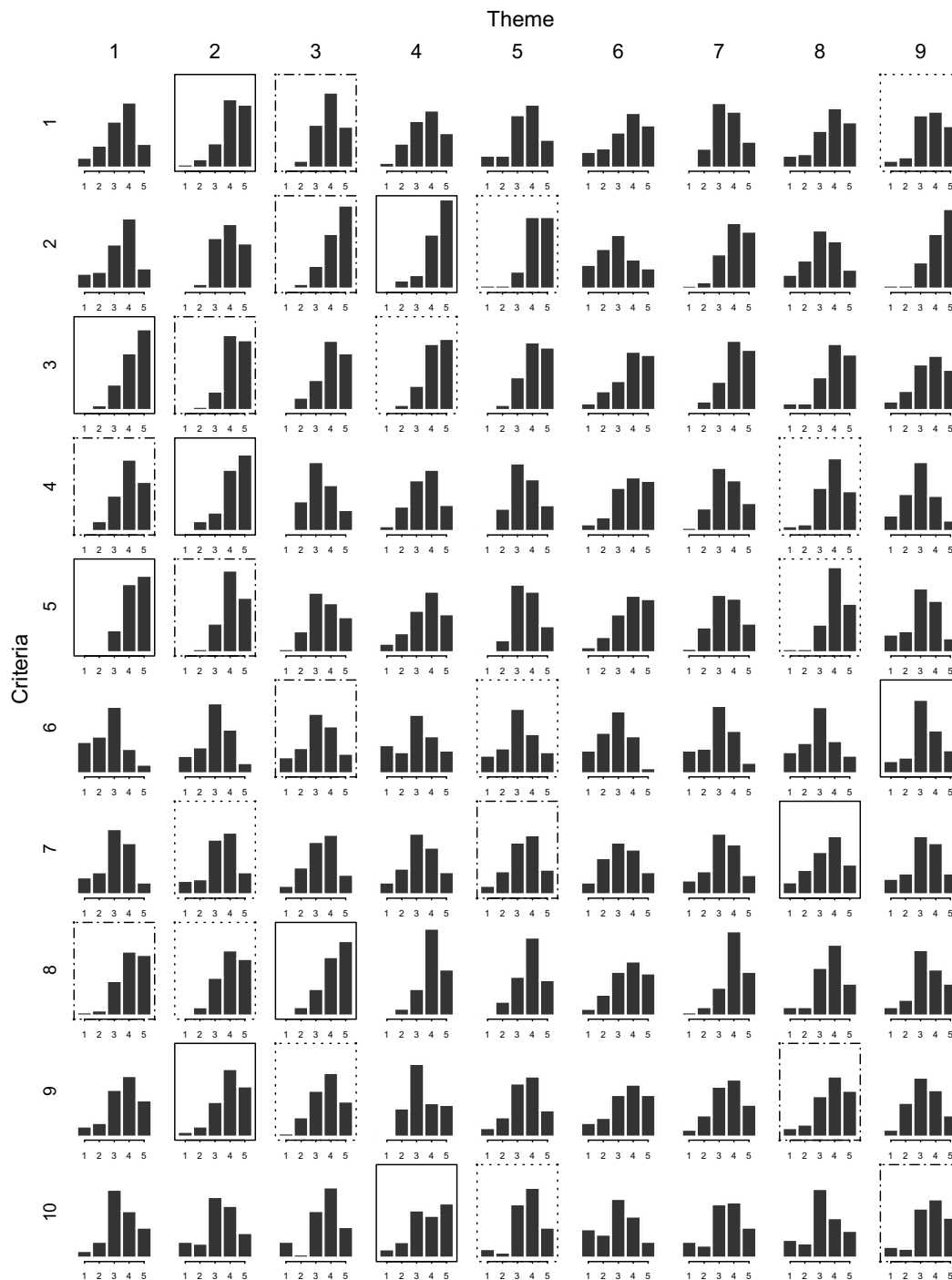


Figure 4. Ranking of research themes by CIHR criteria
The solid box represents the highest rated theme in that criterion, the dash-dot box the second highest and the dashed box the third highest. The Y-axis represents the proportion of respondents and the X-axis the 5-Point Likert scale. For example, in the second criterion, Potential to Improve the Health of Canadians, the fourth theme, Immunity and Vaccine Research, scored the highest.

Theme

1. Efficacy and Cost Benefit Research
2. Disease Patterns Research
3. Emerging Infectious Disease Research
4. Immunity and Vaccine Research

5. Disease-specific Research
6. Health Promotion and Communications Research
7. Safe Food and Water Research
8. Knowledge Translation Research
9. Genomics Research

Criteria

1. Potential to illuminate broader processes/principles
2. Potential to improve the health of Canadians
3. Potential for scientific advancement
4. Potential to reduce current inequalities in health status
5. Potential to improve the effectiveness, efficiency and equity of the health care system

6. Provincial/national competitive advantage
7. Contribution to capacity building in Canada
8. Tackles emergent or increasing public health or health care system problem
9. Bridges across disciplines/practices and themes
10. Fundable through CIHR investigator-initiated competitions

based intervention research, including randomized, controlled trials.

Recommendations were made that this research should involve educators, social marketers, media, consumer groups and vulnerable populations (e.g., Aboriginal people in conjunction with Native Health service providers).

Theme 7: Safe Food and Water Research

Because of the high profile of enteric disease outbreaks, there is currently strong public support for and private sector interest in safe water and food. Further research is needed on best practices to inform the public of healthy practices as well as to develop evidence for new primary prevention methods. Surveillance was the proposed methodology. Participants identified a need for enhanced laboratory tools, especially the development of molecular tests and genomic finger-printing technologies, to determine the incidence of food and water borne diseases. There was a strong call for a provincial coordination mechanism for posting and disseminating research results. As well, participants saw an opportunity for federal coordination of food and water safety initiatives, including the setting of safety standards and the provision of research funding.

Theme 8: Knowledge Translation Research

Translation of research findings into practice is an important component in closing the gap between the research community and the community of public health practitioners. Barriers to knowledge translation, however, are not well defined. Participants saw an opportunity to use evaluation studies as a method of studying knowledge translation, dissemination of information, public knowledge and the public's sources of information. The methodologies recommended for this area of research include marketing and social research, and program/technology evaluation.

Theme 9: Genomics Research

Participants identified the importance of developing and employing genomic tools to characterize genetic susceptibility to disease; type the strains causing disease; help with faster, more sensitive diagnosis; characterize pathogens and discover new virulence genes; and more accurately determine

infection prevalence. Participants commented that investment in genomics was a long-term investment in the basic science of infectious disease prevention and was of cross-cutting importance to several other research themes.

Capacity-building themes

In addition to research-specific themes, six capacity-building themes emerged from a synthesis of the data. Capacity-building themes focus on the creation and development of a more robust research infrastructure, including funding for BC researchers.

Theme A: Attraction and Retention

BC was seen to have a critical mass of talented researchers with a significant breadth of experience, particularly in the areas of microbiology, molecular biology, genomics, epidemiology, mathematical modeling, HIV/AIDS, vaccine evaluation, clinical infectious disease and health informatics. However, a shortage in the area of virology was also identified.

Theme B: Education and Training

The need to educate public health practitioners and to enhance their research skills on the transmission dynamics of infectious disease and methods for prevention and control was identified as a priority. Strategies such as cross-appointment and involvement in community-based research projects were viewed as potentially helpful.

Theme C: Collaboration and Networks

Throughout the consultation, participants identified the importance of collaboration as a means of meeting BC's infectious disease research needs. Although there is a well-respected pool of individual researchers, across several disciplines key informants reported that the greatest barrier to success is the fragmentation of the BC research community. Isolation and lack of leadership were cited in both the academic and hospital sectors.

It was suggested that there is a need to create a research consortium to define what we need to know and the research tools necessary to address the questions in an integrated and coordinated way. Participants suggested this should involve funders, academic health centres and universities.

Theme D: Funding

Key informants identified 38 funding agencies or partnerships currently funding their research activities. Over 25% of reported research projects receive funding from CIHR. The next most common organizations funding reported research in BC were the Natural Sciences and Engineering Research Council (7%), the Centers for Disease Control and Prevention, Atlanta (6%), and the US National Institute of Health (5.6%). Many key informants reported receiving funding from industry in addition to peer-reviewed funding. This suggests that current infectious disease research in BC is strongly influenced by private sector priorities.

Participants identified the need for focused funding to support research that addresses the expressed needs of population health practice.

Recommendations were to:

- articulate public health goals and an attendant research agenda in order to stimulate funding;
- make research funding decisions based on input from the public health field;
- shift the focus of research to prevention and control by addressing the benefits and the return on investment.

Theme E: Communication: Dissemination of Research Findings and Obtaining Public Health Input

Key informants and stakeholders acknowledged that the dissemination of research results is currently weak with a disconnection between the research and public health communities. Consultation with key informants revealed that the majority of their research results are disseminated through scientific publications and peer-reviewed journals (41%). National or international speaking engagements (15%), seminars or similar conferences (11%) or other types of meetings (8%) were the next most common channels. Users, on the other hand, need and seek early access to information through credible sources. They need reports and articles containing interpretations of research results and findings that are more easily translated into practice.

Currently, there is no mechanism for identifying and tracking research projects in progress. This information is largely inaccessible (in BC as elsewhere) other

than through informal communication among peers. This gap means that gaining perspective on current research activity is challenging for all concerned. Participants identified the need to provide a clearinghouse function to list current researchers and research activities and allow input, feedback and coordination of research efforts.

Theme F: Surveillance, Informatics and Databases

Participants identified a significant need for improved database management. There were calls for better linkages between databases and improved ease of access to information. Particular needs identified included behavioural risk-factor surveillance and improved infectious disease surveillance. Linked databases were seen to have a largely untapped potential for enhanced utility in surveillance.

DISCUSSION

To the best of our knowledge, this is the only study of needs, gaps and opportunities in infectious disease research conducted at a provincial level in Canada. Our findings indicate that there exists a gap between research activity and the needs of public health practice in the field of infectious disease prevention and control. Identified gaps closely parallel those found in the general field of population and public health over the past three decades.²⁻⁵ Many of our specific findings provide important lessons for a forward-thinking infectious disease research agenda.

The current health research agenda was seen to be driven by the interests of individual investigators as well as by the pharmaceutical and biotechnology sector. While much of this research has been successful, many opportunities appear to have been missed because of a lack of linkage between investigators, the private sector and public health. By creating partnerships, collaborations and networks, participants in this study believed it was possible to tap into synergy not present in the more isolated approaches to research.

Infectious disease research was rated by most stakeholders as only a low or medium priority on the health research agenda. Yet comments indicated that research on infec-

tious disease prevention and control should receive more attention because of the re-emergence of infectious diseases; the need to understand the potential links to chronic, allergic and autoimmune disease; the high risk associated with outbreaks; and the huge cost of infectious disease to public health and the health care system. These comments, made prior to the SARS outbreak, seem prescient today.

While studies of efficacy and cost-benefit research in infectious disease prevention and control were considered as essential elements to program implementation, it became clear that new mechanisms to support and fund such studies are needed. This has become even more important since 2002, given the BC government's requirement for evidence-based core programs in all areas of public health. New funding mechanisms, perhaps as a dedicated line item within public health budgets, were identified as supporting this important line of research.

The relative importance of the research themes identified in this study has become only more apparent since 2002, when the study was conducted. Themes related to detection of and response to emerging diseases, immunology and vaccine research, and genomics were all identified. During the SARS outbreak of 2003, it was necessary to marshal virologists to identify the pathogen, make use of genomic technologies to characterize the agent, and to develop an unprecedented marriage of public health science and emergency management to push the rapid development of diagnostic tests and research on vaccines and other prevention strategies.^{6,7}

The study identified that funders, in addition to scientists, need to work more closely with those practising public health. Front-line workers need to see the value of research in informing practice and be encouraged to participate in the formulation and conduct of research. Consultation indicated that a high priority, capacity-building initiative should be the development of a research consortium to define the BC research agenda and facilitate the funding and management of research projects in an integrated and coordinated way. To date, there have been early steps in forming a public health research consortium to discuss priorities and coordination of research among public health practition-

ers, but mechanisms for connection to the broader research and practice community are still required. If BC and other local developments are successful, a national network such as the National Collaborating Centre for Infectious Diseases may be a necessary mechanism to coordinate activities across the country.

Measures to disseminate research findings in an ongoing fashion are needed at both the provincial and national levels. In particular, support is necessary to establish a clearinghouse/databank of researchers and research activities in order to track research projects, report findings, facilitate feedback and better coordinate research efforts. In short, a routine mechanism for knowledge synthesis is required, which again may be facilitated at the national level by the National Collaborating Centre for Infectious Diseases.

Lastly, better resources for enhanced surveillance systems and linked databases were identified as critical. The BC Ministry of Health is making progress with data stewardship to enhance the efforts of local health services research. While it is heartening that the federal government is also providing re-investment in infectious disease surveillance through the Canada Health InfoWay, the disconnection between this new approach and earlier development in the public health sector is a cause for concern.

In conclusion, this study was framed in a context in which infectious disease remains an area of long-term, vital public health concern at both regional and national levels. This was true in 2002 and has only been underscored by subsequent experience with SARS, *Clostridium difficile*-associated diarrhea, community-associated methicillin-resistant *Staphylococcus aureus* and H5N1 avian influenza. Developing a research agenda that guides public health policy and programs is the essential challenge for control and prevention of infectious disease in the 21st century. The study calls for CIHR and its funding partners to support research in areas addressing the needs of public health practice, with a focus on prevention and control programs. CIHR should contribute to the articulation of a national agenda for public health research based on defined public health goals and make funding decisions on population health based on consultation with

public health practitioners. The methodology used in this study shows that it is both feasible and important to conduct such an analysis at the national level.

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