

Research article

Identifying research priorities on infections in older adults: proceedings of an interdisciplinary workshop

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Abstract

Background: Infections pose a substantial burden to the health of older adults. In this report, we describe the proceedings of a workshop to formulate and prioritize research questions about infections in older adults using an interdisciplinary approach.

Methods: Researchers from four sectors (basic science, clinical sciences, health services and epidemiology/determinants of health) and representatives from various Canadian local, provincial, and federal stakeholder groups were invited to a two-day workshop. Five multi-disciplinary groups and stakeholders from each of three healthcare settings (long term, acute care and community) discussed research priorities for each of the settings. Five to ten research questions were identified for each setting.

Results: The research questions proposed ranged from risk factors and outcomes for different infections to the effect of nutrition on infection and the role of alternative and complementary medicine in treating infections. Health service issues included barriers to immunization, prolongation of hospital length of stay by infection, use of care paths for managing infections, and decision-making in determining the site of care for individuals with infections. Clinical questions included risk factor assessment for infection, the effectiveness of preventative strategies, and technology evaluation. Epidemiologic issues included the challenge of achieving a better understanding of respiratory infections in the community and determining the prevalence of colonization with multi-resistant bacteria.

Conclusions: The questions are of direct relevance to researchers in a wide variety of fields. Bringing together a multi-disciplinary group of researchers to frame and prioritize research questions about aging is feasible, participants valued the opinions of people working in other areas.

Background

Older adults consume a disproportionate amount of healthcare resources in Canada. Persons over the age of 65 years make up 12% of the general population, but account for 31% of acute hospital days and half of all hospital stays [1]. The proportion of older adults in Canada is expected to rise to 20% by 2021 [2], so meeting the future healthcare needs of this vulnerable population will be formidable. The provision of care for older adults with infectious diseases will be part of this challenge. The vast majority of excess deaths and hospitalizations due to respiratory infections occur in older adults, with more than 44,000 hospitalizations for pneumonia and influenza in people aged 65 and older in 1997 [1]. In Canada, as well as in the United States, older adults who live in long-term care facilities are at especially high risk of these respiratory infections, for which they are frequently transferred to hospital [3–6].

To improve the care of older adults with infections, a research agenda which incorporates a wide range of issues is needed. Questions about the basic biology, clinical science, delivery of health services, and broader determinants of infectious diseases in older adults need to be generated and prioritized. We believe that an interdisciplinary approach to identifying, prioritizing, and conducting research about infections in older adults will result in better health for this population. In the development of the Canadian Institutes of Health Research, Canada's new health research funding agency organized through a framework of 13 "virtual" institutes, Canada's three major federal funding agencies (Medical Research Council, National Science and Engineering Research Council, Social Sciences and Humanities Research Council) sponsored workshops in 1999 to foster collaboration among researchers from four disciplines: epidemiology/determinants of health, health services, clinical sciences, and basic science. This Tricouncil Workshop/Networking Program was designed to promote research linkages that bridge the traditional boundaries of research activity supported by the councils individually. It supported multi-disciplinary workshops as well as the development of research agendas, collaborative networks and other similar initiatives to assist health research scientists to compete effectively for Canadian Institutes of Health Research funding opportunities. This was to be done by developing and strengthening research contacts, networks and groups on a specific health research theme, through exchanges of knowledge, insights and approaches among researchers, practitioners and users. It was also to test innovative ideas and approaches for tackling medium to long-term issues in health research in areas which require the collaboration of disciplines or faculties traditionally supported by at least two of the three granting councils.

In this report, we describe the proceedings of the workshop entitled "Identifying research priorities on infections in older adults", held in Hamilton, Ontario on April 13 and 14, 2000. The objective of this workshop was to formulate and prioritize research questions of infections in older adults using an interdisciplinary framework.

Methods

Participant and stakeholder lists were developed by a 12-member committee and expanded through Internet searches of seniors-related web-sites and literature. Speakers for the workshop were selected based on their extensive published research and experience in each of the four research disciplines.

Invited participants were selected from each of four research disciplines: basic science, clinical sciences, health services and epidemiology/determinants of health. Participants included geriatricians, basic scientists, medical directors of long-term care facilities, nurse specialists, epidemiologists, nutritionists, infection control practitioners, public health officials, social scientists, family medicine physicians, pharmacists, microbiologists, and infectious disease physicians. A diverse group of organizations and agencies were represented at the workshop, including universities, regional geriatric programs, geriatric research units, long-term care research networks, acute care hospitals, long-term care facilities, home care nursing associations, provincial hospital associations, national nursing and geriatric nursing associations, health ministries, and pharmaceutical companies.

The workshop began with speakers from each of the four research disciplines broadly describing key issues in their respective discipline. Issues presented included immunologic changes associated with aging and nutritional strategies aimed at reversing immune senescence [7]; the challenge of conducting clinical research with older adults in long-term care facilities, including the difficulty in diagnosing infection and the limited availability of data in this area [8]; providing health services to older adults, including the limitations of administrative database research on current risk adjustments and the choice of outcome measures in this population [9]; and a presentation of a framework on how broader determinants of health may be examined with respect to infectious diseases in older adults [10].

The 54 participants were assigned to five groups and given instructions on how to frame research questions for both quantitative and qualitative research questions [11,12]. Specifically, the statement of study population, comparison, outcomes in a quantitative question versus the open-ended, hypothesis-generating nature of qualitative questions was emphasized. Each group included

individuals from different research disciplines and stakeholders from each of the three different healthcare settings (long term, acute care and community). Participants in each group, assisted by a facilitator, discussed research priorities for each healthcare setting (acute care, community, long-term care). Five to ten research questions were identified for each setting. The questions generated from each group were collated. The facilitators taped all sessions and took written notes.

Following each session, participants reviewed the research questions generated and ranked the ten most important questions by assigning a numeric value from "1" to "10" for each question. The rankings were summarized by the Q – sort methodology, in which the numerical values for the ranking were inverted so that questions with the lowest priority ("1") were given the numeric value of "10", and vice versa [13]. Then for each question, the assigned numeric values were summed across all participants' lists. During the final half day of the workshop, the list of ranked research questions was presented to the entire group for discussion. This allowed participants to review and change rankings and ensure there was broad consensus about the results. Questions which were similar were amalgamated.

Results and Discussion

The research questions developed through this process are listed in order of priority sorted by healthcare setting (Tables 1 to 3). The research questions proposed by the workshop participants were diverse. They ranged from risk factors and outcomes for different infections, the impact of infections on quality of life, to the effect of nutrition on infection and the role of alternative and complementary medicine in treating infections (Tables 1,2,3). The questions related predominantly to health services, clinical sciences, and epidemiology/broader determinants. Health service issues participants deemed to be important included barriers to immunization, prolongation of hospital length of stay by infection, use of care paths for managing infections, the impact of infection on quality of life, and decision-making in determining the site of care for individuals with infections. Clinical questions included risk factor assessment for infection, the effectiveness of preventative strategies, and technology evaluation, such as the utility of videos in swallowing assessment. Epidemiologic issues included the challenge of achieving a better understanding of respiratory infections in the community and determining the prevalence of colonization with multi-resistant bacteria. These questions are of direct relevance to researchers in a variety of fields including primary care, nursing, nutritional science, public health, health services, gerontology, geriatrics, infection control, and infectious diseases.

Table 1: Research questions for the acute care setting in descending order of priority.

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1. In frail older adults, does the use of a critical care pathway for management of pneumonia reduce hospital stay and improve health-related quality of life?
 2. For older adults over the age of 85 years, does admission to an intensive care unit for sepsis reduce mortality?
 3. In hospitalized older adults, what are the modifiable risk factors for nosocomial pneumonia?
 4. What are the barriers to implementation of a hospital-based pneumococcal vaccination program for older adults?
 5. In older adults admitted to hospital with respiratory symptoms, how common is infection with influenza?
 6. Does a computer-based learning intervention improve nurses' knowledge about infection control precautions for hospitalized older adults?
 7. Compared to intravenous therapy, are highly bioavailable oral antibiotics effective in treating older adults admitted to hospital with pneumonia?
 8. In older adults with nosocomial pneumonia, what are the most important predictors of excess length of stay?
 9. Compared to usual care, do oral feeding programs for hospitalized older adults lead to earlier discharge?
 10. What is the effectiveness of nursing-based strategies to reduce infection in hospitalized high risk older adults?
 11. In hospitalized older adults, do swallowing evaluations and diet modifications reduce pneumonia and other respiratory infections?
 12. Does early mobilizing of hospitalized older adults reduce the overall infection rate?
 13. Amongst older adults admitted to hospital from nursing homes, what is the prevalence of colonization with multi-resistant bacteria and how common is transmission of these multi-resistant bacteria to other hospitalized patients?
 14. In older adults, does early discharge from hospital reduce the risk for infection?
 15. For older adults admitted to hospital with nursing home acquired pneumonia, does the addition of empiric anti-pseudomonal antibiotic coverage to standard therapy reduce mortality?
 16. For specific nosocomial infections, are older adults treated with a longer duration of antibiotics than younger patients?
 17. For older adults started on antibiotic therapy, does concurrent administration of an oral Lactobacillus preparation decrease the rate of Clostridium difficile-associated diarrhea?
 18. In older adults hospitalized for pneumonia, what is the natural history of functional status?
 19. Does a care path for urinary care reduce duration and frequency of urinary catheterization in older hospitalized patients?
 20. In older adults, does the administration of supplemental oxygen during joint replacement surgery decrease the risk of infection?
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The question of whether a critical pathway for frail older adults with pneumonia can reduce length of hospital stay and improve quality of life received the highest priority ranking for the acute care setting. The Capital Study, a randomized trial for treatment of community acquired pneumonia using a clinical pathway, demonstrated that

Table 2: Research questions for the community setting in descending order of priority.

1.	What is the prevalence of methicillin resistant <i>Staphylococcus aureus</i> (MRSA) in the community and what are the risk factors for its acquisition?
2.	In frail older adults with influenza, do neuraminidase inhibitors reduce influenza-related complications?
3.	Among older adults living in the community, what are most effective strategies for optimizing antibiotic prescribing?
4.	What is the burden of illness due to infections in older adults living in the community?
5.	What is the incidence and etiology of community acquired pneumonia in older adults?
6.	What do healthcare providers and policy makers perceive to be barriers to implementation of home care agency vaccination programs?
7.	Do nutritional supplementation strategies prevent community acquired infection in older adults?
8.	Are alternative and complementary medicine therapies effective in preventing and treating infections in older adults?
9.	What is the burden of illness due to infections in older adults receiving home care and what strategies are effective in preventing these infections?
10.	What are the barriers to influenza and pneumococcus vaccination in older adults?
11.	What are the most effective strategies to combat misinformation regarding risks of pneumococcal and influenza immunization?
12.	Does a feeding and positioning strategy for community-based neurologically impaired older adults reduce the risk for pneumonia?
13.	How can the diagnosis of community-acquired respiratory infections be improved in older adults?

patients managed using the pathway had a reduced stay in hospital and a quality of life equivalent to patients managed with usual care [14]. Whether a critical pathway, in addition to reducing time in hospital, leads to improved quality of life in patients over the age of 85 is unknown however. Ranked second for the acute care setting was the issue of whether admission of older adults over the age of 85 to intensive care for sepsis actually reduces mortality. This question obviously has important implications for patients, their families, and clinicians. Although reasonable rates of long-term survival in critically ill elderly patients requiring intensive care has been demonstrated [15,16], outcomes of intensive care for patients 85 years and older specifically for sepsis have not been assessed. For the community setting, determining the prevalence of MRSA in the community received the highest priority. Addressing this question can potentially provide information about transmission patterns of MRSA as well as the need for empiric vancomycin therapy in older adults with presumed community-acquired *Staphylococcus aureus* infection. In Canada, true community acquired MRSA has been documented in the

First Nations population [17], but little is known about the prevalence in the general population. The second question prioritized for the community setting asks whether neuraminidase inhibitors, new anti-viral agents, reduce complications of influenza in older adults in the community. Although these agents reduce duration of symptoms for influenza, they have not demonstrated clear benefit in reducing complications such as hospitalization or death in the population at highest risk: older adults [18,19]. In the long-term care setting, the question which received the highest priority addressed factors associated with transfer to acute care hospital. Fried and colleagues found that only tachypnea and evaluation in the evening were associated with hospital versus long-term care facility evaluation and initial treatment [20]. However, their study long-term care facility was characterized by extensive physician involvement, potentially limiting the generalizability of the findings as stated by the authors. The second question prioritized for this setting asked whether institutional factors can help reduce the spread of antibiotic resistance. Factors of potential importance may include staffing, use of handwashing, use of anti-bacterial soaps, or the availability of sinks. Although Li and colleagues found an association between staffing levels and outbreaks in nursing homes in New York State [21], there has been no data addressing the effect of such variables on antibiotic resistance.

Not surprisingly, the research questions developed in this workshop closely reflected the ideas, experience, and agenda of the participants. To maintain feasibility, the majority of participants were from southern Ontario, limiting the choice of participants. These factors may have led to the high rank accorded to determining the prevalence of methicillin resistant *Staphylococcus aureus* (MRSA) in the community, likely a reflection of participants' interest in infection control as well as of the particularly high prevalence of MRSA in southern Ontario. Albeit infrequently, individuals with MRSA with no obvious risk factors (such as previous hospitalization) are being recognized in southern Ontario and concern about this likely led to the high rank for MRSA. Another limitation was that there were few basic scientists represented at the workshop. This led to a list of clinically oriented questions with few basic research questions. However, despite the limitations imposed by our sample, we believe that the format used for this workshop can serve as a model for other research groups who wish to generate and prioritize research questions. Recently, research priorities have been developed in such diverse areas including critical care, physical activity and health among people with disabilities, and in emergency medical services for children [22–24]. Research agendas need to be comprehensive and cover the continuum of health-

Table 3: Research questions for the long-term care facility setting in descending order of priority.

1.	What factors are associated with the decision to transfer residents of long-term care facilities with fever or suspected infection to acute care hospitals?
2.	What institutional strategies are effective in preventing infection in residents of long-term care facilities?
3.	Does early nutritional intervention reduce severity or duration of infection?
4.	Does a clinical pathway for management of nursing home acquired pneumonia improve outcomes and reduce cost?
5.	What is the impact of MRSA on the quality of life in older adults who reside in long-term care facilities?
6.	In the emergency room, what factors are associated with the decision to admit older adults with nursing home acquired pneumonia?
7.	What is the most effective strategy for reducing inappropriate antibiotic prescribing?
8.	What is the diagnostic accuracy of definition of infection in residents of long-term care facilities?
9.	What quality of life outcomes resulting from infection are important from the perspective of staff, relatives and family?
10.	What are the attitudes, perceptions, and beliefs of long-term care facility residents, healthcare providers, families regarding on-site treatment of infection in the long-term care facility?
11.	In long-term care facilities, do isolation precautions reduce transmission of antibiotic resistant bacteria?
12.	In residents of long-term care facilities, does eradication therapy for MRSA reduce transmission of this organism?
13.	In residents of long-term care facilities with acute delirium and bacteriuria, do antibiotics improve mental status?

care settings. Our experience suggests that bringing together a multi-disciplinary group of researchers to frame and prioritize research questions about aging is feasible, and that participants valued the opinions of people working in other areas. In fact, the workshop has resulted in several multi-disciplinary collaborative partnerships among the participants. We also feel that the resultant list of research questions will help not only the workshop participants but also other researchers focus their interest in infections among older adults.

In order to disseminate the list of prioritized research questions, we plan to forward the research questions to Canadian geriatric and gerontologic research units as well as infectious disease research units which can distribute the results of the workshop to their members and post them on relevant web sites. We also will forward our findings to local provincial public health units, infection control practitioner associations, physician groups, long-term care groups, provincial funding agencies and advisory councils on aging.

Conclusions

The questions are of direct relevance to researchers in a wide variety of fields primary care, nursing, nutritional science, public health, health services, gerontology, geriatrics, infection control, and infectious diseases. Our experience suggests that bringing together a multi-disciplinary group of researchers to frame and prioritize research questions about aging is feasible, and that participants valued the opinions of people working in other areas.

Additional material

List of attendants for the Tri-council Workshop - April 13th and April 14th 2000, Hamilton, Ontario, Canada.

List of names, titles, and corresponding institutions of Workshop participants

List of participants.doc

[<http://www.biomedcentral.com/content/supplementary/1471-2318-1-1-s2.doc>]

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