

# Technology

## *Report*

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**Telephone  
Triage Services:  
Systematic  
Review and a  
Survey of  
Canadian Call  
Centre Programs**

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**Canadian Coordinating Office for Health Technology Assessment**

**Telephone Triage Services: Systematic Review  
and a Survey of Canadian Call Centre Programs**

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## **Conflicts of Interest**

Dawn Stacey, Hussein Z. Noorani, Andrea Fisher, David Robinson, Janet Joyce, and Raymond W. Pong disclosed no conflicts.



## **Telephone Triage Services**

### **Technology Name**

Teletriage

### **Technology Description**

Telephone triage, or teletriage, is a service in which health professionals provide support, via telephone, to clients who initiate calls about health concerns. Teletriage is performed by registered nurses or physicians in a variety of settings. The goal of teletriage is to determine the level of care required by the caller and to discuss the options and urgency for care. Depending on the assessment information obtained, options for the caller may be self-care or informal care; a routine visit to a practitioner; an immediate visit to the emergency department or urgent care clinic; or dispatch of an ambulance.

### **The Issue**

The use of teletriage is evolving. Even though little is known about the clinical or cost effectiveness of teletriage, the number of these programs is expanding.

### **Assessment Objectives**

- To evaluate the effects of teletriage services on health service use, caller safety, satisfaction and health-related quality of life
- To examine the costs and cost-effectiveness of teletriage services
- To summarize the characteristics of Canadian teletriage programs and their evaluations.

### **Methods**

A systematic literature review was used to address the first two objectives. Selected studies were assessed using a standard screening tool. To gather data on teletriage in Canada, the Canadian Coordinating Office for Health Technology Assessment surveyed programs funded by provincial and territorial governments.

### **Conclusions**

- About 50% of calls to teletriage services can be managed without having to refer the caller elsewhere.
- Teletriage reduces the number of immediate visits to physicians without causing adverse outcomes such as subsequent hospitalizations, visits to the emergency departments or deaths.
- Two studies – one in the US and one in the UK – show cost savings as a result of nurse teletriage services that are provided outside usual business hours.
- Seven Canadian jurisdictions have province-wide teletriage programs (British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec and New Brunswick) and the other six have identified a need.
- The limited number of evaluations of teletriage programs in Canada show minimal evidence of their clinical impact (e.g. high caller satisfaction, decreased visits to emergency). The cost per call is estimated to be C\$10 to C\$27 depending on the program.

This summary is based on a comprehensive health technology assessment available from CCOHTA's web site ([www.ccohta.ca](http://www.ccohta.ca)): Stacey D, Noorani HZ, Fisher A, Robinson D, Joyce J, Pong RW. **Telephone triage services: systematic review and a survey of Canadian call centre programs.**

# EXECUTIVE SUMMARY

## The Issue

Telephone triage (teletriage) is the provision of telephone support by health professionals for client-initiated inquiries to determine the level and urgency of care needed to address the health issue. The most common delivery models are nurse [registered nurse (RN) or nurse practitioner (NP)] or physician (MD) teletriage in practice-based settings; or RN teletriage through call centre programs. Even though teletriage is expanding across Canada, not much is known about its clinical impact or cost-effectiveness.

## Objective(s)

- To evaluate the clinical impact of teletriage services through their effects on health service use, safety, self-care and informal care, satisfaction, health-related quality of life and access to other resources
- To examine the economic impact (costs, cost-effectiveness) of teletriage services
- To summarize the characteristics and evaluations of Canadian teletriage programs.

## Clinical Review

**Methods:** For the systematic review, the literature search included seven databases, the Internet, reference lists of included studies and contact with experts. Two reviewers screened all citations to identify teletriage services evaluated using comparative study designs. Selected studies were assessed using a standard screening tool. For the included studies, two independent reviewers extracted data, evaluated methodological quality and analyzed the data.

**Results:** Of the 10 UK or US studies that met the inclusion criteria, six were randomized controlled trials, two were pre-post test studies, one was a case control study and one was a time series study. Various delivery models were compared. Most RN teletriage interventions included the elements that are considered to be necessary for quality programs: provider orientation, clinical protocols integrated with documentation and monitoring of program quality. Despite differences in interventions, the 10 studies indicated that teletriage decreased immediate practitioner visits without increasing adverse outcomes such as subsequent hospitalizations, emergency department (ED) visits or deaths. The studies showed that about half of the calls were managed by the teletriage service, so that no visit to a physician or ED was needed. Caller satisfaction ranged from 55% to 90% for RN teletriage provided through call centre programs and was about 70% for MD teletriage. The effect of teletriage on immediate visits to the ED, subsequent contact with practitioners and health-related quality of life was less clear.

## Review of Economic Studies

**Methods:** For the three studies, two independent reviewers extracted data and evaluated methodological quality. One reviewer summarized the data.

**Results:** No published Canadian economic studies were identified. Three cost studies for RN teletriage were examined. One UK study and one US study demonstrated statistically significant cost savings for after-hours teletriage, mainly due to reductions in ED and MD visits. In the other UK study, it was unclear whether the costs associated with RN teletriage during office hours led to

savings because costs did not differ between usual care and teletriage; the cost analysis included subsequent visits (that may not have been related to the initial call) over an unusually longer period of one month compared with other studies; and there were a small number of events.

## **Survey of Canadian Teletriage Programs**

**Methods:** A survey questionnaire was pilot-tested. Teletriage programs and key contacts in provinces and territories (“jurisdictions”) were identified. The revised questionnaire was sent to jurisdictional representatives with follow-up for clarification conducted when necessary.

**Results:** There was a 100% response rate to the survey. Within the last nine years, six jurisdictions have launched teletriage through RN call centre programs. In addition, one jurisdiction officially launched a teletriage program in September 2003, another will implement a program within two years and five have identified a need for teletriage services. The objectives of the existing programs differ in the degree to which they are intended to promote self-care and informal care and provide health education. Teletriage in the existing programs is available to all residents 24 hours a day, seven days a week. The nurses are guided by clinical protocols. These RN call centres also provide management for acute symptoms; referral to other services such as emergency response; and health information. Five of the six programs underwent evaluations, which demonstrated high caller satisfaction with the service (range of 86% to 99%). Three programs report decreased non-urgent visits to the ED (range of -8% to -32%). Three programs have undertaken an economic analysis. The cost per triage call, which ranges from C\$10 to C\$27, varies by program, based on the number of staff employed and the population served.

## **Conclusions**

Despite the growing use of teletriage, little international research has been done using comparative study designs to determine the effectiveness or cost-effectiveness of services. Little research has been done in Canada. Findings from US and UK studies suggest that teletriage, by RNs, NPs or MDs, reduces immediate visits to physicians without causing adverse outcomes such as subsequent hospitalizations, ED visits or deaths. About half of the calls can be managed via the telephone alone. Most callers are satisfied with the service. Two economic studies demonstrate cost savings as a result of RN teletriage services provided outside regular business hours.

In Canada, seven provinces have province-wide call centre teletriage programs, one jurisdiction plans to start a program within two years and the other five have identified a need. These programs vary in size, type, experience, resources and scope. Evaluations done on five of the seven programs are limited, producing minimal evidence of clinical impact (high caller satisfaction, decreased ED visits) and providing estimates of costs per call (C\$10 to C\$27).

Given the lack of comparative research, it is premature to determine the “best” model. RN teletriage call centre programs in Canada target a large proportion of the population and provide universal access to an immediate response for health issues. Factors that enhance program integrity and minimize the risk of litigation include clinical protocols to guide the telephone consultation; orientation and continuing education for providers; and ongoing monitoring of program quality.

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# ABBREVIATIONS

24/7	24 hours a day, 7 days a week
AB	Alberta
BC	British Columbia
C\$	Canadian dollar
CCS	case control study
CI	confidence interval
CLSC	centre local de services communautaires
ED	emergency department; emergency room; accident and emergency department
HMO	health maintenance organization
jurisdiction	province or territory
MB	Manitoba
MD	medical doctor, physician
NB	New Brunswick
NP	nurse practitioner
NL	Newfoundland and Labrador
NR	not reported
NHS	National Health Service in the United Kingdom
NS	Nova Scotia
NT	Northwest Territories
NU	Nunavut
ON	Ontario
PE	Prince Edward Island
PPS	pre-post test study design
QC	Quebec
RCT	randomized controlled trial
RN	registered nurse
SK	Saskatchewan
SD	standard deviation
teletriage	telephone triage
TSS	time series study
US	United States
US\$	United States dollar
UK	United Kingdom
WMD	weighted mean difference
YT	Yukon Territory

# 1 INTRODUCTION

## 1.1 Background

Over the last 15 years, there has been an increase in the use of dedicated telephone triage (teletriage) services. Teletriage is the provision of telephone support by health professionals for client-initiated telephone health inquiries and a system for directing callers to the appropriate level of care, including self-care and informal care.

By definition, triage is the act of sorting according to quality.<sup>1</sup> Triage in health services is the process of “sorting patients into order of priority for treatment.”<sup>2</sup> The attraction of triage lies in the idea that health care costs may be reduced if clients who do not need immediate care can be diverted from high-cost services such as emergency departments (ED); and clients who cannot be helped by physicians can be reassured or assisted with self-care and informal care.

Teletriage is one of several “tele” services that fall under the umbrella term of telehealth.<sup>3,4</sup> The common characteristic of telehealth, telemedicine, telenursing, tele-homecare and teletriage is the use of communication technologies (e.g. telephone, videoconference, e-mail, digital imaging) to transfer clinical information. Key differences in these services are their goals; the characteristics of the providers and receivers; and the type of technologies involved.

The process of teletriage involves communication via telephone to determine the most appropriate level of care required to address a health issue and to determine the urgency for action. These options include self-care and informal care strategies, routine or urgent visits to a personal practitioner, immediate ED and urgent clinic care or dispatch of an ambulance. Teletriage services may also include the provision of information; guidance for complex health decisions; and symptom management to facilitate (if appropriate) self-care and informal care.

Physicians (MDs) have practised the equivalent of teletriage to prioritize office visits for non-urgent issues.<sup>5</sup> With changing models of care, however, MDs are choosing other methods of triage for after-hours calls from clients.<sup>6,7</sup> These include such options as having an on-call MD providing teletriage for several practices and teletriage services provided by registered nurses (RNs).

More formalized RN teletriage services, with clinical protocols guiding the telephone consultations, are being established in MD group practices or as independent call centre programs. Factors motivating the recent rise in more formalized teletriage programs include:<sup>6,8-15</sup>

- the volume of ED visits
- a desire to minimize inappropriate health care visits
- shorter hospital stays, resulting in more acutely ill clients in the community
- models of primary care that require practitioners to provide 24-hour care
- emphasis on self-care and informal care to support and empower clients
- clients’ demand for and access to health information
- enhanced continuity of primary care services outside regular hours

- advances in information and communication technologies
- the need for equitable access to health services (e.g. for those with limited mobility, those disinclined to have face-to-face consultation, those living in remote locations)
- in the US, provision of managed care with a view to reduce costs and marketing strategies to attract customers to health maintenance organizations (HMOs).

The rise in RN teletriage is also supported by physicians' changing interest in providing teletriage services. After-hours care can be demanding and could have a negative influence on the recruitment and retention of general practitioners.<sup>16</sup> For example, in one study of 38 general practitioners in the UK, it is reported that they have low confidence in providing teletriage consultation.<sup>17</sup> Factors influencing MDs' confidence include the lack of visual cues, insufficient information about the caller and little training in teletriage.<sup>17</sup> The ability to generalize this study's findings may be limited by the small sample size (n=38) and the fact that the participants are younger (mean age=42 years) and mainly female (n=27).

In the nursing community, there is a growing recognition of the contribution of RNs to teletriage. This expanding role is highlighted by the recent establishment of an American teletriage nursing conference<sup>18</sup> and a Canadian college-based teletriage continuing education program.<sup>19</sup> There has also been an increase in the number of teletriage-related nursing publications and guidelines from nursing professional organizations globally.<sup>20-25</sup>

Canada has experienced a steady rise in formalized teletriage programs. Teletriage through province-wide RN call centre programs has been available for several years in Quebec (QC), Manitoba (MB) and New Brunswick (NB). More recently, programs have been initiated in British Columbia (BC), Ontario (ON) and Alberta (AB). In addition, new models of primary care proposed in ON identify group practice RN teletriage services as a means to address after-hours health care needs 24 hours a day, 7 days a week (24/7).<sup>11</sup> Less is known about the plans for teletriage programs in the other Canadian provinces and territories.

These teletriage initiatives are congruent with three recent Canadian reports.

1. The 2002 Romanow Commission on the Future of Health Care in Canada<sup>12</sup> recommends access to an integrated 24-hour continuum of primary health care for all Canadians.
2. Two of the four strategic goals of the Canada Health Infoway Advisory Committee<sup>26</sup> are to empower the public to make informed health and health care choices; and to strengthen and integrate health care services. One strategy identified to address these goals is the provision of "telephone triage, self care information, and tools to improve access to enable citizens to care for themselves where appropriate."
3. A framework of guidelines for telehealth (including teletriage) accreditation has been developed under the auspices of the National Initiative for Telehealth Guidelines (NIFTE). The objective of NIFTE is to develop accreditation standards for telehealth activities and programs in Canada, with a view to improving the quality of services. The development of the framework is based on an environmental scan on four telehealth-related issues: technology; human resources; organizational leadership; and clinical standards and

outcomes. NIFTE has released two sets of documents: the environmental scan report and the framework of guidelines.<sup>27,28</sup>

Internationally, teletriage is conducted in MD group practices and larger population-based programs in several developed countries.<sup>29-32</sup> For example, in the UK, the National Health Service (NHS) RN call centre program, NHS Direct, provides teletriage that augments the existing services provided in MD group practices and the EDs.<sup>33</sup> As a result, most people in the UK have access to teletriage services via one or more of these three models.

Despite the wide range of activities, little is known about the overall effectiveness of teletriage. In addition, there is a lack of information on the characteristics and evaluation of the provincial and territorial teletriage programs in Canada.

As of February 2003, there have been one rapid review<sup>34</sup> and one systematic review<sup>35</sup> of RN teletriage, but no reviews that have examined MDs or pharmacists in this role. The rapid review concludes that RN teletriage is useful, but there is a lack of evidence about its impact on health outcomes and cost.<sup>34</sup> The other review suggests that, based on four randomized controlled trials (RCTs) and two case control studies (CCS), RN telephone consultation provided alone or combined with other self-care and informal care resources reduces MD workload; encourages self-care and informal care for health problems; and decreases health care costs without increasing adverse outcomes.<sup>35</sup>

Given the increasing number of new programs across Canada and the costs associated with these programs, there is a need for a more inclusive and updated systematic review to explore the evidence for the effectiveness of teletriage.

## 1.2 Technology Overview

Teletriage requires access to a telephone, practitioners available to respond to calls and clients aware of the service. To ensure program quality and minimize the risk of litigation,<sup>20,36</sup> several additional elements are needed.

- Practitioners with specialized education in teletriage and access to continuing education opportunities are required. Education programs can address the process of consultation, barriers to teletriage and the medicolegal aspects of providing advice over the telephone.
- A documentation system is necessary to ensure that the interactions and services provided are recorded. Documented calls can then be used to enhance the continuity of care; audit the services provided; augment the memory of providers; and if need be, enhance the defensibility of actions. Ideally, the documentation should be integrated with that of other health services such as the caller's personal practitioner.
- Clinical protocols guide practitioners' responses to calls and enhance the quality of the interaction. Quality standardized protocols are evidence-based, updated regularly, integrated into the teletriage service and used consistently.
- Continuous quality improvement programs are necessary to ensure the delivery of high quality service and an early response to potential problems. Examples include taping calls for

quality monitoring, conducting follow-up satisfaction surveys with callers and tracking quality indicators.

The two models for teletriage are MDs or RNs responding to calls in group practice settings; and RNs providing teletriage in population-based call centre programs that are independent of MD practices (e.g. NHS Direct, HMOs, Info-Santé in Quebec, Telehealth Ontario). The potential advantages of practice-based teletriage over call centre services are the increased likelihood of access to personal health information and the greater possibility of continuity in primary care services. Without access to callers' personal health information, providers have little alternative but to listen carefully to what the caller says.

There are differences in the characteristics and issues related to the teletriage provided by MDs compared with that provided by RNs.

**a) MD Teletriage**

The specific characteristics of MD teletriage services are not reported in the literature. Most services occur after hours with MDs being autonomous in and accountable for their actions. MDs often provide after-hours teletriage in addition to their regular daytime duties.

**b) RN Teletriage**

Regulating organizations recommend that RNs providing teletriage have specialized knowledge, skills and judgment.<sup>8,9,20-25</sup> RNs provide teletriage services either informally in a manner similar to that of MDs or more formally through teletriage programs. The process that RNs use during the teletriage interaction includes assessing the health issue and individual capacity, communicating effectively with active listening, making relevant decisions with the caller, determining access to appropriate resources and evaluating the process and outcomes.<sup>9,20</sup> Clinical guidelines or protocols are used to standardize this approach. These protocols are typically developed or purchased and customized in collaboration with MDs. RNs then apply their judgment to apply protocols according to the individual caller's situation. This may require deviating from the protocols.<sup>9,20</sup> Many teletriage programs provide training for their RNs as part of the orientation process, have a system to formally document the calls and include a medical consultant on staff. In more formal teletriage programs, RNs work in shifts to provide teletriage services as part of their regular duties and not as an addition to daytime responsibilities.

Teletriage programs also require space, office equipment, databases, computers, formalized clinical protocols and indemnity insurance.<sup>8</sup>

## **2 THE ISSUE**

Telephone triage (teletriage) provides professional support via the telephone for caller-initiated inquiries to assess the level of health care required by the caller and to determine the urgency for care. The most common models of delivery are nurse (registered nurse (RN) or nurse practitioner (NP)) or physician (MD) teletriage in practice-based settings or RN teletriage through call centre programs. Teletriage is expanding across Canada. Not much, however, is known about its clinical impact or cost-effectiveness.

## **3 OBJECTIVES**

This project has three objectives.

1. To evaluate the clinical impact of teletriage services on the following outcomes:

### Primary outcomes

- impact on immediate health service use: office visits, home visits, ED visits, hospitalizations
- impact on health service use in the days after the telephone contact: office visits, home visits, telephone contact
- safety: hospitalization, deaths and ED visits in the days after telephone contact

### Secondary outcomes

- calls managed via telephone alone
- client satisfaction with the service provided
- impact on client health-related quality of life
- access to other resources

2. To examine the economic impact (costs, cost-effectiveness) of teletriage services
3. To summarize the characteristics of Canadian teletriage programs and their existing evaluations.

## 4 SYSTEMATIC REVIEW LITERATURE SEARCH

### 4.1 Methods

#### 4.1.1 Literature search strategy

To evaluate the clinical and economic impact of teletriage services, published literature was obtained using a systematic review search strategy (Appendix 1). Retrieval was limited to the literature published from January 1980 to February 2003. The year 1980 was chosen as the beginning date for the literature search, given that an earlier systematic review identified studies using telephone services published as early as 1983.<sup>35</sup> There were no language restrictions.

On the DIALOG<sup>®</sup> system, a OneSearch<sup>®</sup> was performed on MEDLINE<sup>®</sup>, Cancerlit<sup>®</sup>, PsycINFO<sup>®</sup> and EMBASE<sup>®</sup>. Parallel searches were run on PubMed, CINAHL via Ovid Technologies Inc.<sup>®</sup> and The Cochrane Library on CD-ROM (The Cochrane Collaboration and Update Software). An economic filter was used to capture papers on the economic aspects of teletriage. All searches were originally performed in August 2002 and updated on the DIALOG<sup>®</sup> system in February 2003. The updated CINAHL search used the CINAHL Information Systems CINAHLDirect<sup>®</sup> interface. A customized Reference Manager<sup>®</sup> database was created, records imported and duplicates removed.

Using key terms identified for the electronic database search, grey literature searches were conducted. Grey literature was defined as “studies that are unpublished, have limited distribution, and/or are not included in bibliographical retrieval systems.”<sup>37</sup> For example, the web sites of health technology assessment and related agencies, specialized databases such as the University of York NHS Centre for Reviews and Dissemination, study registries such as Clinical Trials Database (U.S. National Institutes of Health) and others such as the Health Canada web site, were searched. In addition, Google<sup>™</sup> and other search engines were used to identify Internet resources. Reference lists of included articles were hand searched. Canadian experts from each jurisdiction were contacted through the survey performed for this report.

#### 4.1.2 Selection criteria

The criteria for determining studies to include in the clinical and economic systematic reviews are based on the characteristics of the intervention, study design, participants and outcome measures.

##### **a) Intervention**

The primary intervention is client-initiated telephone calls, for the management of a health problem, placed to a teletriage service staffed by practitioners. These services include independent programs (e.g. call centres) or services provided in MD group practices. In this review, “practitioners” include RNs, NPs, MDs or pharmacists. The services include triage to the level of care required (including self-care and informal care) and determination of the urgency for provision of care. They may include use of other health resources such as self-care handbooks or Internet-based information. Among the interventions excluded from this definition

are telephone services provided by health care professionals who are not RNs, NPs, MDs or pharmacists; telephone support provided by volunteers; other methods of communication (e.g. Internet or video conferencing); follow-up calls initiated by professionals post-discharge from hospital or as part of a care program; chronic disease management programs; nutrition and healthy lifestyle support; or telephone psychotherapeutic support (such as suicide prevention lines).

**b) Study design**

Given the difficulty in using RCT designs for population-based teletriage programs, the inclusion criteria are expanded to include CCS, pre-post test studies (PPS) and time series studies (TSS) comparing teletriage intervention with another form of teletriage or conventional care (e.g. clinic, home, or ED visits). Excluded designs are other types of reports such as quality improvement initiatives, case series, surveys, audits and program evaluations.

**c) Participants**

The study population includes men and women aged 14 years and older who initiate contact with a teletriage service to obtain advice about a health-related issue for themselves or someone else. Situations where simulated callers with hypothetical health issues were used are excluded.

**d) Outcome measures**

Studies measure primary and secondary clinical outcomes and economic outcomes as identified in our objectives.

### **4.1.3 Screening procedures**

Two reviewers (DS and AF) independently screened citations using an initial screen of all titles and abstracts for reports that were potentially relevant; and a standard screening tool for a more detailed screen (Appendix 2). The screening tool included inclusion and exclusion eligibility criteria as outlined in the selection criteria. Disagreements were resolved by consensus. If a disagreement was not easily resolved, a citation was included until the entire report was reviewed. The complete report was retrieved for all eligible and questionable citations. The two reviewers (DS and AF) independently reviewed the full-text reports for inclusion using the standard screening tool. Disagreements were resolved by consensus.

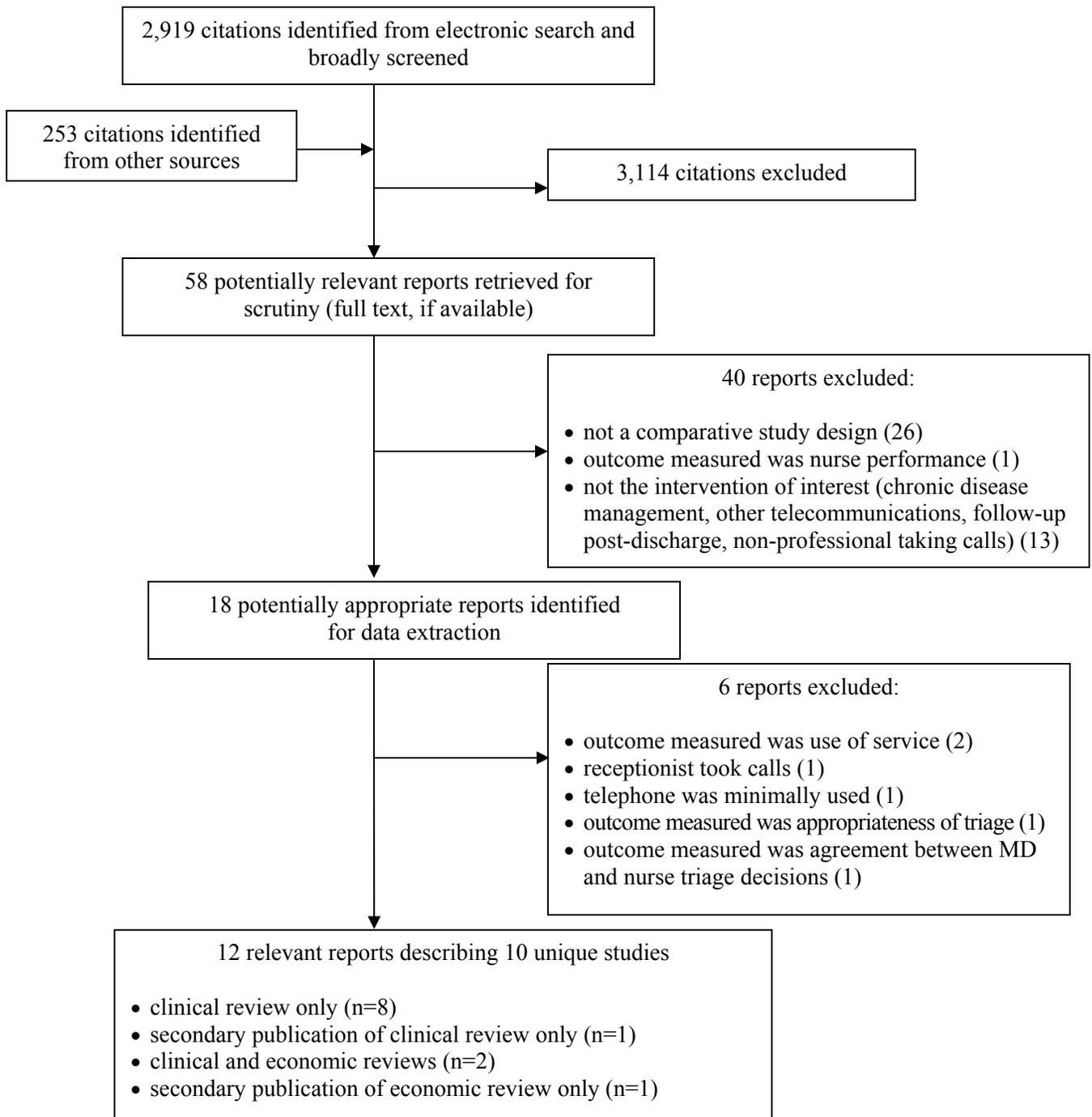
## **4.2 Results**

### **4.2.1 Quantity of research available**

There were 2,919 unique citations identified from electronic databases and 253 additional reports from hand searching (n=3,172). Of these, 58 potentially relevant citations were identified. Full reports were obtained for these 58 citations (Figure 1). Citations were excluded if they described the training of RNs, RNs' roles in teletriage, clinical protocols and documentation tools for teletriage, another telecommunications technology, legal implications, follow-up post-hospital discharge, program surveys or audits, a program without evaluation or nothing related to teletriage.

After reviewing the 58 full reports, 46 were excluded and 12 were included in the systematic review. Reasons for excluding the potentially relevant reports included non-comparative study design (n=26), not the intervention of interest (n=15) and not the outcome of interest (n=5). For details about the 46 excluded reports, see Appendix 3. Of the 12 included reports, there were 10 unique studies. Eight reports were used for the clinical review only; one was a secondary publication used for the clinical review only; two were used for the clinical and economic review; and one was a secondary publication used for the economic review only. An additional eight studies identified were in progress or pending publication (Appendix 4).

**Figure 1:** Flowchart of selected reports



## **5 CLINICAL REVIEW**

### **5.1 Methods**

#### **5.1.1 Data extraction strategy**

Data were independently extracted from the 10 eligible studies by two reviewers (DS and AF) who used a standard form (Appendix 5). The data extraction form, based on one used in a previous systematic review of RN telephone consultation,<sup>35</sup> was pilot tested and modified by both reviewers.

#### **5.1.2 Quality assessment**

Two reviewers (DS and AF) independently assessed the quality of the included RCTs, by using the Jadad scale.<sup>38</sup> This scale allocated two points to randomization, two points to blinding and one point to description of withdrawals (Appendix 5): the higher the Jadad score, the higher the quality (possible range of zero to five). This scale, which was previously evaluated for reliability, used criteria that were consistent with those of other scales for quality assessment.<sup>39</sup> The adequacy of the process for randomly allocating individuals or calls to the intervention or comparison groups was assessed using an allocation concealment scale, with the descriptors “adequate” (e.g. use of opaque envelopes, central office assignment), “inadequate” (e.g. alternation, reference to case record number or date of birth) and “unclear” (e.g. not reported or fits neither category).<sup>40</sup>

The CCS was evaluated using the unpublished Newcastle-Ottawa quality assessment scale (NOS)<sup>41</sup> (Appendix 5). This scale allocated four stars for selection process; two stars for comparability of cases and controls; and three stars for exposure to the intervention. Preliminary findings indicated that higher scores meant higher quality (possible range of zero to nine).

The quality of PPS and TSS was assessed by considering the potential threats to validity that were associated with these designs. Possible threats included co-intervention, statistical regression, maturation, testing, instrumentation, seasonal trends, selection and cyclical influences.<sup>42</sup>

#### **5.1.3 Strategy to assess publication bias**

Given the small number of studies that measured similar outcomes, publication bias was unassessed. Efforts were made to minimize publication bias by contacting individuals who were involved with the evaluation of teletriage or call centre programs in Canada and searching Internet sites that published the results of funded research projects.

#### **5.1.4 Data analysis methods**

Characteristics of the studies, interventions and results were summarized in tables. The results were analyzed descriptively by one reviewer (DS); audited by a second reviewer (AF); and reported using groups of similar comparisons: MD-NP teletriage versus ED visits; deputizing MD (an independent on-call MD service) versus practice MD teletriage; RN versus MD

teletriage; RN teletriage versus MD visit; and RN-NP-MD teletriage versus no teletriage. If necessary, descriptive statistics were used for simple computation in studies for each outcome. Relative risk (RR), weighted mean difference (WMD) and 95% confidence intervals (95% CI) based on intention to treat analysis were calculated for individual outcomes in studies using Review Manager 4.1 software. Given the small number of studies identified and the variation in their outcome measures, data pooling was unfeasible.

## 5.2 Results

### 5.2.1 Characteristics of included studies

Of the 10 included studies, there are six RCTs, two PPS, one CCS and one TSS. In all studies, clients initiate telephone contact to request same-day consultation. The characteristics of the included studies are summarized in Table 1 (see at the end of Section 5.2).

#### **a) MD-NP teletriage versus ED visits (n=1)**

The Franco<sup>43</sup> (1997) CCS evaluated the teletriage service provided after hours by the MD or NP acting as a gatekeeper for a Medicaid population in the US versus direct access ED services. The comparison group was historical controls that predated the intervention by 10 years.

#### **b) Deputizing MD versus practice MD teletriage (n=1)**

The Cragg<sup>44,45</sup> (1997) RCT evaluated deputizing MD (an independent on-call MD service) versus practice MD after-hours teletriage in 14 group practices in the UK. The unit of randomization was unspecified.

#### **c) RN versus MD teletriage (n=3)**

Three RCTs evaluated RN versus MD teletriage services. Two RCTs conducted in the UK evaluated after-hours calls in the same group practice; the Thompson<sup>46</sup> (1999) trial focused on night calls and the Lattimer<sup>47</sup> (1998) trial evaluated evening and weekend calls. The goal of these equivalence trials was to establish that both interventions had the same effect. Given an inability to conclude that the two interventions were equally good, the authors calculated limits within which equivalence could be assumed. The randomization was all out-of-hours calls during one day (weekends treated as single units) selected out of two consecutive two-week blocks.

The Lee<sup>48</sup> (2002) RCT compared the handling of out-of-hours calls directed by pager to RN teletriage in a call centre program versus an on-call pediatrician from the group practice in the US. All medical emergency calls were directed by pager to a service provider independent of the RN or MD teletriage. The unit of randomization was individual calls.

#### **d) RN teletriage versus MD visit (n=1)**

The Richards<sup>49</sup> (2002) TTS compared RN teletriage with MD in-person visits in the UK.

#### **e) RN-NP-MD teletriage versus no teletriage**

Two RCTs and two PPS evaluated the introduction of teletriage provided by RNs, NPs or MDs compared to standard practice without teletriage services. The McKinstry<sup>50</sup> (2002) RCT compared MD teletriage to no teletriage for callers requesting same-day appointments in a UK

group practice. In this study, the unit of randomization was the individual call. The Darnell<sup>51</sup> (1985) RCT compared MD teletriage in a US group practice to no teletriage for clients who had the option of calling before going to the ED. However, the use of telephone triage for health problems outside clinic hours was new and there were challenges with clients forgetting or not using the service. Many teletriage MDs continued to refer callers to the ED. A cluster randomization design was used and the unit of randomization was the practice team.

In the Elwyn<sup>52</sup> (1999) PPS, the two days of the week that the NP provided teletriage in the mornings were compared with days that teletriage was unavailable in a UK group practice. The O'Connell<sup>10</sup> (2001) PPS compared RN teletriage in a US health plan call centre with no teletriage.

### **5.2.2 Characteristics of main teletriage intervention**

In all 10 studies, the intervention provided was teletriage for a health problem (Table 2) (see at the end of Section 5.2). The usual outcomes of triage included self-care and informal care, primary care practitioner visit and ED visit. In one of the study, the RN teletriage provided in a call centre program also included other services such as health information, referral for an MD visit and information about the caller's health plan.<sup>10</sup>

In the studies involving mainly RNs (n=6), teletriage was guided by clinical protocols. All but the Elwyn<sup>52</sup> study described the documentation of calls as being integrated with these protocols. Only the O'Connell<sup>10</sup> study described the clinical protocols as being based on research evidence and expert opinion with an ongoing commitment to updates.

Orientation provided to RNs on the teletriage role was indicated in four of these six studies. RNs in two trials<sup>46,47</sup> received a six-week orientation program. The Richards<sup>49</sup> TTS reported that nurses received 30 hours of instruction. The fourth study by O'Connell<sup>10</sup> did not give details about the duration of orientation. No information was given about access to clinical protocols or teletriage orientation for MDs.<sup>43,44,50,51</sup>

### **5.2.3 Quality of included studies**

The results from the quality assessment were listed in Table 1. None of the studies were blinded. All the RCTs (n=6) were randomized, with four trials obtaining the full score of two<sup>46-48,50</sup> and the other two trials obtaining a score of one.<sup>44,51</sup> Only the Lee<sup>48</sup> RCT reported loss to follow-up. The overall mean quality score for the six RCTs was 1.8 out of five (range of one to three). If blinding was eliminated from the total score, the overall mean quality score would be 1.8 out of three. The allocation concealment was rated as adequate for the four trials<sup>46-48,50</sup> that also received a higher Jadad score and as unclear for the other two RCTs.<sup>44,51</sup>

The Franco<sup>43</sup> CCS received a rating of one star out of a possible score of nine stars. The star was awarded for the use of similar methods to ascertain exposure for cases and controls.

**a) MD-NP teletriage versus ED visits**

The Franco<sup>43</sup> CCS had a low rating of one star and was limited by the use of historical controls based on clients' visits to the ED 10 years earlier. The comparability was further limited by the number of participants during the intervention period being almost double that of the historical control group and by the lack of control for the statistically significantly different participant characteristics between groups (e.g. proportions of African-American, Medicaid users and school-aged children).

**b) Deputizing MD versus practice MD teletriage**

The Cragg<sup>44</sup> RCT had a lower quality score of one out of three, with unclear allocation concealment, randomization and unit of randomization.

**c) RN versus MD teletriage**

The three RCTs received a higher quality rating of two out of three with a clear description of the allocation concealment.<sup>46-48</sup> There was no requirement for follow-up in two trials. In the Lee<sup>48</sup> RCT, the follow-up interview was completed with 98.8% of callers in each arm of the study. In the same trial, however telephone operators directed medical emergency calls to an emergency service that was independent of the RN or MD teletriage and during busy periods, callers were not recruited for the study. In addition, a larger number of RNs worked in the teletriage call centre program and were unknown to the callers, as compared with a smaller number of MDs providing teletriage who were known to the callers.<sup>48</sup>

**d) RN teletriage versus MD visit**

The quality of the Richards<sup>49</sup> TSS was limited by its study design, which included a potential for co-intervention over the one year of the study. Also, the types of presenting health problems were statistically significantly different between the two groups but not controlled for in the analysis.

**e) RN-NP-MD teletriage versus no teletriage**

The two RCTs and two PPS were of mixed quality. The Darnell<sup>51</sup> RCT had a lower quality rating of one out of three and it did not describe the allocation concealment process. Its quality was limited by the significant change in the use of technologies over the last 18 years. Furthermore, only about half of eligible calls were used for data analysis, because computer documentation was only available for 49.5% of calls during the first 18 months of the study and 58.2% in the subsequent 18 months. It was unclear what effect these limitations had on the results.

The McKinstry<sup>50</sup> RCT had a higher quality score of two out of three with a clear description of the allocation concealment. Complete data were available for 78.3% of callers randomized to the teletriage intervention and for 96.9% of callers in the MD visit usual care group.

The quality of the two PPS<sup>10,52</sup> was limited by potential threats to validity posed by the study design (e.g. events occurring over the study period, maturity of callers). For the Elwyn<sup>52</sup> PPS, a selection of calls (sore throat, cough, earache, emergency contraception and conjunctivitis) occurring on the same two half days per week over two months were eligible. No comparisons were made between the types of calls made before versus after the teletriage service was

implemented. The quality of the Elwyn<sup>52</sup> study was further limited by its small sample size and the short period used for evaluation. The O'Connell<sup>10</sup> PPS tried to address the potential bias of co-intervention by conducting a survey of plan administrators to identify changes in plan membership or programs, such as those to ED services or related policies over the two-year period of the study. To attend to the possible influence of callers' previous experiences using the teletriage service, the caller's age, plan types and previous experiences were controlled for in the analysis.

#### **5.2.4 Assessment of clinical impact**

All except one outcome were identified *a priori* for the clinical review of teletriage services. The objective that was added during the systematic review was the proportion of calls managed via telephone alone without planned use of other health services. The results are summarized in Tables 3 to 6 (see at the end of Section 5.2).

##### **a) Impact on immediate health service use**

The impact of teletriage on immediate health service use included changes in home or clinic practitioner visits and ED visits within 24 hours.

*Practitioner Visits:* All studies (n=6) that evaluated the effect of the teletriage intervention on practitioner visits demonstrated a reduction in home and clinic visits. Comparing RN to MD teletriage, Lattimer<sup>47</sup> and Thompson<sup>46</sup> demonstrated statistically significant reductions in MD visits. Visits were reduced by 31% (RR 0.69; 95% CI: 0.66, 0.72) during evenings or weekends<sup>47</sup> and 42% (RR 0.58; 95% CI: 0.37, 0.89) at night.<sup>46</sup> The O'Connell<sup>10</sup> PPS showed a smaller but statistically significant reduction in MD visits of 5% (from 2,683 to 2,549 visits per 1,000 enrolled members per year) for continuously enrolled members of the program over two years.

When RN teletriage was compared with MD visits in the Richards<sup>49</sup> TSS, there was a statistically significant reduction of 32% in MD clinic and home visits (RR 0.68; 95% CI: 0.65, 0.71). In the Elwyn<sup>52</sup> PPS, NP teletriage service decreased MD clinic visits by 27% (from 16 to 11.7 visits per day). Despite this decrease, 23% of calls managed by the NP resulted in same-day clinic consultation with the NP and 17% were managed via the telephone.

When practice MDs were compared to deputizing MDs in the Cragg<sup>44</sup> RCT, deputizing MDs had a number of clinic or home visits that was statistically significantly higher by 22% (RR 1.22; 95% CI: 1.2, 1.3). This calculation was based on the disposition of total calls received.

*ED Visits:* Two of three studies showed a decrease in ED visits resulting from teletriage. When clients who were self-referred to the ED were compared to clients directed there by the teletriage MD or NP, the Franco<sup>43</sup> CCS found a statistically significant reduction in ED visits from 10.1% in the 10-year historical control group to 7.6% in the teletriage group (RR 0.78; 95% CI: 0.68, 0.90). The O'Connell<sup>10</sup> PPS compared RN to MD teletriage and found a statistically significant reduction of 4.3% in ED visits for continuously enrolled members (from 207 to 198 visits per 1,000 members per year, p<0.02). A smaller reduction of 2.8% was observed for all enrolled members. The Darnell<sup>51</sup> RCT, conducted more than 15 years ago, found no difference between

groups even after the number of calls increased fourfold in phase two compared with phase one through promotion aimed at drawing attention to the teletriage service.

*Hospitalizations:* The impact of teletriage on hospitalizations was evaluated in four RCTs. Two RCTs found statistically significant reductions in hospital admissions; the Lattimer<sup>47</sup> trial compared RN to MD teletriage (RR 0.87; 95% CI: 0.76, 0.99) and Darnell<sup>51</sup> compared MD teletriage to no teletriage (RR 0.88; 95% CI: 0.79, 0.98). In the other two RCTs,<sup>44,46</sup> there was no difference in hospitalization rates within 24 hours of the call, although the Thompson<sup>46</sup> RCT was underpowered to detect within-trial equivalence for this outcome.

**b) Impact on subsequent health service use**

The impact on subsequent primary care health service use (e.g. practitioner clinic visits, home visits, repeat telephone contact) was evaluated for most studies within three to 14 days after the initial telephone contact. One study by Richards<sup>49</sup> evaluated this outcome four weeks after the initial telephone contact.

*Subsequent Practitioner Visits:* Of four RCTs, there was one increase, one decrease and two with no change in practitioner clinic or home visits occurring over the two weeks after the initial call. The McKinstry<sup>50</sup> RCT that compared MD teletriage to no teletriage found a statistically significant increase of 20% in MD visits within two weeks after calls (WMD 0.20; 95% CI: 0.05, 0.35). The Lee<sup>48</sup> RCT, comparing RN to MD teletriage, demonstrated a statistically significant decrease of 45% in visits within three days (RR 0.55; 95% CI: 0.36, 0.85); despite the fact that the frequency with which a visit was advised was the same for RN and MD triage calls (RR 1.04, 95% CI: 0.81, 1.33). The Thompson<sup>46</sup> and Cragg<sup>44</sup> RCTs found no difference; although the Thompson RCT was underpowered to detect within-trial equivalence for this outcome.

The Richards<sup>49</sup> TSS that measured MD visits within the subsequent four weeks found an increase of 31% (WMD 0.31; 95% CI: 0.22, 0.40).

*Repeat Telephone Calls:* Two RCTs evaluated the impact of teletriage on repeat telephone calls three to 14 days after the initial call. The Lee<sup>48</sup> RCT showed a statistically significant increase of 10% (95% CI: 5.8%, 14.5%) in repeat calls for RN triage compared with MD triage. The McKinstry<sup>50</sup> trial comparing MD teletriage to no teletriage found no difference.

**c) Safety**

The safety of teletriage was determined by measuring the occurrence of adverse effects resulting in higher level health service use (e.g. hospitalizations or ED visits) or deaths within days after the initial telephone contact. Most studies measured these adverse effects for three to 14 days after the call, but the Richards<sup>49</sup> TTS monitored callers up to 28 days.

*Subsequent Hospitalizations:* For RN versus MD teletriage, the Lattimer<sup>47</sup> RCT found a statistically significant reduction in hospitalizations within the subsequent three days for evening and weekend callers (RR 0.86; 95% CI: 0.76, 0.97) and the Thompson<sup>46</sup> RCT showed no difference for calls undergoing triage during the night (RR 0.77; 95% CI: 0.26, 2.28). The Thompson RCT, however, was underpowered to detect within-trial equivalence for this outcome.

*Subsequent ED Visits:* Four studies found no difference in ED visits within two weeks of the teletriage call.<sup>46-48,50</sup> A fifth study by Richards<sup>49</sup> found a 2% increase in ED visits in the subsequent four weeks for RN teletriage compared with in-person MD visits (WMD 0.02; 95% CI: 0.01, 0.03).

*Deaths:* With RN versus MD teletriage, there was no difference in death rates within seven days of calls on evenings and weekends (RR 0.88; 95% CI: 0.62, 1.25)<sup>47</sup> or calls during the night (RR 1.23; 95% CI: 0.18, 8.58).<sup>46</sup> The Thompson RCT<sup>46</sup> was underpowered to detect within-trial equivalence for this outcome. The death rate per call during the night in the Thompson RCT was threefold higher compared with that in the Lattimer RCT.

#### **d) Proportion of calls managed via telephone alone**

Eight of the 10 studies reported the number of calls that could be managed via telephone alone with the potential to encourage callers to be involved in self-care and informal care. Five involved group practice MDs, one involved deputizing MDs, one involved NPs and five involved RNs providing teletriage (Table 4).

*MD Teletriage:* In five studies, the mean proportion of calls that practice MDs managed via telephone alone was 50.9% (range of 20.7% to 72.2%).<sup>44,46-48,50</sup> Two RCTs found that an additional 15%<sup>47</sup> and 19%<sup>46</sup> of the calls referred from an RN to an MD were subsequently managed by the MD via telephone alone.

*Deputizing MD Teletriage:* The Cragg<sup>44</sup> RCT found that deputizing MDs managed 1.4% of the total of 1,106 calls compared with 20.7% managed by practice MDs via telephone alone (RR 0.07; 95% CI: 0.04, 0.11).

*NP Teletriage:* The Elwyn<sup>52</sup> PPS that evaluated NP teletriage for a select group of health problems (e.g. sore throat, cough, earache, emergency oral contraception, conjunctivitis) found that NPs managed 17% of the calls via telephone alone.

*RN Teletriage:* Five studies found that RNs managed a mean of 45% (range of 26% to 59%) of calls via telephone alone.<sup>10,46-49</sup> There were no differences in the proportion managed via telephone for RNs compared to MDs for calls occurring on evenings and weekends (RR 1.00; 95% CI: 0.97, 1.04)<sup>47</sup> or during the night (RR 0.95; 95% CI: 0.77, 1.18).<sup>46</sup>

#### **e) Caller satisfaction**

Four studies measured satisfaction with the teletriage service provided<sup>10,44,48,51</sup> and one evaluated callers' perception of teletriage using the patient enablement instrument.<sup>50</sup>

Table 5 summarizes the similarities and differences in the characteristics of the instruments and methods used to evaluate satisfaction. Two of the five studies reported the instrument used.<sup>44,50</sup> One of the two reported the reliability and validity of the instrument.<sup>44</sup> Most studies measured satisfaction within days of the teletriage consultation, using a five-point scale ranging from low satisfaction to high satisfaction.<sup>10,44,48,50</sup> Items in the questionnaires varied among studies; the most common were satisfaction with the quality of the interaction (n=5), overall satisfaction

(n=3), satisfaction with the timing of teletriage consultations (n=3) and satisfaction with quality of care (n=2).

A summary of the results for satisfaction with teletriage is presented in Table 6. The median response rate representing four<sup>10,44,48,50</sup> of the five studies was 68% (range of 54% to 99%). Most callers (>69%) were satisfied with the teletriage provided by practice MDs<sup>44,48,51</sup> and 59% of callers who received teletriage from a practice MD were willing to use the service again.<sup>50</sup> For teletriage provided by call centre RNs, the Lee<sup>48</sup> RCT and O'Connell<sup>10</sup> PPS reported satisfaction at 55% and 90% respectively.

Three trials compared satisfaction results between the main teletriage intervention group and the comparison group. Callers were statistically significantly less satisfied with RN call centre compared with practice MD teletriage (55% versus 69%)<sup>48</sup> and deputizing MD compared with practice MD teletriage (62% versus 71%).<sup>44</sup> McKinstry<sup>50</sup> found no difference between those who received teletriage compared to an in-person visit by a practice MD.

**f) Impact on caller health-related quality of life**

Only the Cragg trial<sup>44</sup> measured the impact of teletriage on health-related quality of life using the validated medical outcomes study 36-item short form health survey (SF-36). There was no difference between calls undergoing triage from a deputizing MD compared to a practice MD.

**g) Access to other resources**

None of the studies included access to other resources with the teletriage or comparison interventions.

**h) Other**

Although unstated *a priori* in this systematic review, the Franco<sup>43</sup> CCS evaluated the appropriateness of visits to the ED that came via teletriage referral compared to self-referral. Clients referred to the ED after MD-NP teletriage were more appropriate compared to clients that went directly (92% versus 59%,  $p < 0.05$ ).

**Table 1:** Characteristics of included studies

Study, Location, Length of study	Design	Objective(s)	Intervention versus Control	Quality Rating and Allocation Concealment	Teletriage Setting	Call before Seeking Care	Sample Size (intervention versus control)	Outcomes Measured
Cragg <sup>44</sup> 1997 (primary), McKinley <sup>45</sup> 1997 (secondary), UK, 1 year	RCT; unit of randomization, unclear	To compare process and outcome of out-of-hours care provided by MDs in group practices and by commercial deputizing services.	Deputizing MD teletriage versus MD teletriage	1/5 Jadad; unclear	After hours. Group practice=14, MDs=49, deputizing=183, clients n/r	Yes	1,106 versus 1,046	<ul style="list-style-type: none"> <li>• % calls managed via telephone</li> <li>• MD visits</li> <li>• subsequent MD visits</li> <li>• hospitalizations</li> <li>• caller satisfaction</li> </ul>
Darnell <sup>51</sup> 1985, US, 3.3 years	RCT; unit of randomization, cluster of MDs	To examine effect of after-hours telephone access to MDs and MDs' access to computerized medical records on hospitalizations and ED visits.	MD teletriage versus no teletriage	1/5 Jadad; unclear	After hours. Group practice=27, clients=11,000 adults	No, MD continued to refer to ER	1,849 versus 778	<ul style="list-style-type: none"> <li>• % calls managed via telephone</li> <li>• ED visits</li> <li>• hospitalizations</li> <li>• caller satisfaction</li> </ul>
Elwyn <sup>52</sup> 1999, UK, 7 weeks	PPS	To test practicality of and effect on practice workload of nurse-led telephone triage system.	NP teletriage versus no teletriage	n/m	During clinic hours. Group practice=1, MDs=4.5, clients=8,452 adults, children (>5 years)	Yes	n/r	<ul style="list-style-type: none"> <li>• % calls managed via telephone</li> <li>• MD visits</li> </ul>
Franco <sup>43</sup> 1997, US, 9 weeks	CCS	To evaluate number and appropriateness of ED visits by children 7 years after KenPAC (telephone access and gatekeeping) implementation with use of 1982 data as historical controls.	NP-MD teletriage versus ED visit	1/9 Newcastle-Ottawa scale; n/m (10-year historical control)	After hours. Medicaid group practice=1, MDs=n/r, clients=4,766 children	Yes	364 versus 283	<ul style="list-style-type: none"> <li>• ED visits</li> <li>• appropriateness of visits</li> </ul>
Lattimer <sup>47</sup> 1998 (primary), Lattimer <sup>53</sup> 2000 (secondary), UK, 1 year	RCT; unit of randomization, whole day	To establish whether there was equivalence in number of adverse events generated by general practice cooperative augmented by RN consultation compared with MD-managed calls. To collect data on management of calls, emergency	RN teletriage versus MD teletriage	2/5 Jadad; adequate	After hours. Group practice=19, MDs=55, Clients=97,000 adults, children	Yes	7,184 versus 7,308	<ul style="list-style-type: none"> <li>• % calls managed via telephone</li> <li>• MD visits</li> <li>• ED visits</li> <li>• hospitalizations</li> <li>• deaths</li> <li>• costs</li> </ul>

Study, Location, Length of study	Design	Objective(s)	Intervention versus Control	Quality Rating and Allocation Concealment	Teletriage Setting	Call before Seeking Care	Sample Size (intervention versus control)	Outcomes Measured
		hospitalizations and ED visits among those who contacted out-of-hours service.To undertake economic evaluation of RN telephone consultation in comparison with usual care provided by general practice cooperative.						
Lee <sup>48</sup> 2002, US, 44 weeks	RCT; unit of randomization, each call	To compare caller satisfaction with after-hours medical advice provided by for-profit RN advice service with advice provided by on-call pediatricians.	RN teletriage versus MD teletriage	3/5 Jadad; adequate	After hours. Group practice=1, pediatricians=16, clients=~6,000 children	Yes or unsure	616 versus 566	<ul style="list-style-type: none"> <li>• % calls managed via telephone</li> <li>• MD visits</li> <li>• ED visits</li> <li>• repeat telephone call</li> <li>• caller satisfaction</li> </ul>
McKinstry <sup>50</sup> 2002, UK, 4 weeks	RCT; unit of randomization, each call	To assess effect of telephone consultations on physicians' workload, clinical care indicators, resource use and clients' perceptions of consultations.	MD teletriage versus no teletriage	2/5 Jadad; adequate	During clinic hours. Group practices=2, MDs n/r, clients=10,420 adults and children	Yes	194 versus 194	<ul style="list-style-type: none"> <li>• subsequent MD visits</li> <li>• patient enablement and satisfaction</li> </ul>
O'Connell <sup>10</sup> 2001, US, 2 years	PPS	To assess client satisfaction and health plan's return on investment associated with telephone-based triage service.	RN teletriage versus no teletriage	n/m	24 hours, 7 days a week. Health plan=1, MDs n/r, clients=60,000 adults and children	Yes	n/r	<ul style="list-style-type: none"> <li>• % calls managed via telephone</li> <li>• MD visits</li> <li>• urgent care visits</li> <li>• ED visits</li> <li>• caller satisfaction</li> <li>• costs</li> </ul>
Richards <sup>49</sup> 2002, UK, 1 year	TSS	To compare workloads of MDs and RNs and costs of client care for RN teletriage and standard management of requests for same-day appointments in primary care.	RN teletriage versus MD visit	n/m	During clinic hours. Group practices=3, MDs=16, Clients=20,800 adults and children	Yes	3,452 versus 1,233	<ul style="list-style-type: none"> <li>• % calls managed via telephone</li> <li>• MD visits</li> <li>• MD subsequent visits</li> <li>• ED visits</li> <li>• costs</li> </ul>

<b>Study, Location, Length of study</b>	<b>Design</b>	<b>Objective(s)</b>	<b>Intervention versus Control</b>	<b>Quality Rating and Allocation Concealment</b>	<b>Teletriage Setting</b>	<b>Call before Seeking Care</b>	<b>Sample Size (intervention versus control)</b>	<b>Outcomes Measured</b>
Thompson <sup>46</sup> 1999, UK, two two-week periods	RCT; unit of randomization, whole day	To establish whether RN telephone consultation was equally effective in managing workload at night.	RN teletriage versus MD teletriage	2/5 Jadad; adequate	After hours. Group practice=19, MDs=55, clients=97,000 adults, children	Yes	100 versus 123	<ul style="list-style-type: none"> <li>• % calls managed via telephone</li> <li>• MD visits</li> <li>• subsequent MD visits</li> <li>• ED visits</li> <li>• hospitalizations</li> <li>• deaths</li> </ul>

n/m=not measured; n/r=not reported

**Table 2:** Characteristics of teletriage intervention

<b>Study (design)</b>	<b>Population Reach</b>	<b>Intervention</b>	<b>Hours</b>	<b>Call Before Seeking Care</b>	<b>Services Provided</b>	<b>Clinical Protocols*</b>	<b>Nursing Orientation*</b>
Cragg <sup>44</sup> 1997 (RCT)	Large group practice	Deputizing MD triage	After hours	Yes	Triage	No	No
Darnell <sup>51</sup> 1995 (RCT)	Medium group practice	MD triage	After hours	No, optional	Triage	n/r	n/r
Elwyn <sup>52</sup> 1999 (PPS)	Small group practice	NP triage	Daytime	Yes	Triage	Yes, characteristics n/r	n/r
Franco <sup>43</sup> 1997 (CCS)	Small Medicaid group practice	NP-MD triage	After hours	Yes, mandatory for payment	Triage	No	n/r
Lattimer <sup>47</sup> 1998 Thompson <sup>46</sup> 1999 (RCT)	Large group practice	RN triage	After hours	Yes	Triage	Yes, design n/r, ongoing updates n/r, integrated into documentation	Yes, 6 weeks, characteristics n/r
Lee <sup>48</sup> 2002 (RCT)	Very large US call centre (>500 RNs)	RN triage	24 hours, 7 days a week	Unsure	Triage, symptom management, coaching in self-care, health information	Yes, MD designed, ongoing updates n/r, integrated into documentation	n/r
McKinstry <sup>50</sup> 2002 (RCT)	Medium group practice	MD triage	Daytime	Yes	Triage	n/r	n/r
O'Connell <sup>10</sup> 2001 (PPS)	Large health plan	RN triage	24 hours, 7 days a week	Yes	Triage, health information, referral for MD visit, health plan information	Yes, designed using evidence and expert opinion, ongoing updates, integrated into documentation	Yes, characteristics n/r
Richards <sup>49</sup> 2002 (TSS)	Large group practice	RN triage	Daytime	Yes	Triage	Yes, developed on their own, characteristics n/r, ongoing updates n/r, integrated into documentation	Yes, 30 hours, characteristics n/r

n/r=not reported. \*Use of protocols or orientation of professionals in comparison groups was unidentified.

**Table 3: Summary of results**

Outcome	Intervention	Study	Design (Quality)	Timing	N Intervention	N Comparison	Results	Statistical Significance
Immediate health service use: practitioner visits	RN versus MD teletriage	Lattimer <sup>47</sup> 1998	RCT (2/5)	Immediate	2,494/7,184	3,679/7,308	RR 0.69; 95% CI: 0.66, 0.72	Decreased p<0.05
		Thompson <sup>46</sup> 1999	RCT (2/5)	Immediate	22/100	47/123	RR 0.58; 95% CI: 0.37, 0.89	Decreased p<0.05
	RN teletriage versus MD visit	Richards <sup>49</sup> 2002	TSS (n/a)	Immediate	1,825/3,452	965/1,233	RR 0.68; 95% CI: 0.65, 0.71	Decreased p<0.05
	RN-NP-MD teletriage versus no teletriage	Elwyn <sup>52</sup> 1999	PPS (n/a)	Immediate	11.7 visits per day	16 visits per day	Reduced by 27%	Not reported
		O'Connell <sup>10</sup> 2001	PPS (n/a)	Immediate	2,683 visits/ 1,000 people/ year for continuous enrolled members	2,549 visits/ 1,000 people/ year for continuous enrolled members	Reduced by 5%	Decreased p<0.05
					2,565 visits/ 1,000 people/ year for all members combined	2,660 visits/ 1,000 people/ year for all members combined	Reduced by 3.5%	No difference
	Deputizing MD versus practice MD teletriage	Cragg <sup>44</sup> 1997	RCT (1/5)	Immediate	1,053/1,106	817/1,046	RR 1.22; 95% CI: 1.2, 1.3	Increased p<0.05
Immediate health service use: ED visits	MD-NP teletriage versus ED visits	Franco <sup>43</sup> 1997	CCS (1/9)	Immediate	406/4,766	304 /2,798	RR 0.78; 95% CI: 0.68, 0.90	Decreased p<0.05
	MD teletriage versus no teletriage	Darnell <sup>51</sup> 1985	RCT (1/5)	Immediate	1,177/3,467	529/1,469	RR 0.94; 95% CI: 0.87, 1.02	No difference
	RN teletriage versus no teletriage	O'Connell <sup>10</sup> 2001	PPS (n/a)	Immediate	198 visits/ 1,000 people/ year for continuous enrolled members	207 visits/ 1,000 people/ year for continuous enrolled members	4.3% decrease	Decreased p<0.02
Immediate ER visits					210 visits/ 1,000 people/ year for all members	216 visits/ 1,000 people/ year for all members	2.8% decrease	No difference

Outcome	Intervention	Study	Design (Quality)	Timing	N Intervention	N Comparison	Results	Statistical Significance
Immediate health service use: hospitalization	RN versus MD teletriage	Lattimer <sup>47</sup> 1998	RCT (2/5)	Within 24 hours	375/7,184	440/7,308	RR 0.87 95% CI: 0.76, 0.99	Decreased p<0.05
		Thompson <sup>46</sup> 1999	RCT (2/5)	Within 24 hours	2/100	8/123	RR 0.31 95% CI: 0.07, 1.42	No difference; underpowered
	Deputizing MD versus practice MD teletriage	Cragg <sup>44</sup> 1997	RCT (1/5)	Immediate	47.2%	33.3%	13.9% increase	No difference, p=0.353
	MD teletriage versus no teletriage	Darnell <sup>51</sup> 1985	RCT (1/5)	Immediate	774/3,467	374/1,469	RR 0.88 95% CI: 0.79, 0.98	Decreased p<0.05
Subsequent health service use: practitioner visits	Deputizing MD versus practice MD teletriage	Cragg <sup>44</sup> 1997	RCT (1/5)	Within 14 days	313/1,106	316/1,046	RR 0.94 95% CI: 0.82, 1.07	No difference
	RN versus MD teletriage	Thompson <sup>46</sup> 1999	RCT (2/5)	Within 3 days	8/100	18/123	RR 0.55; 95% CI: 0.25, 1.20	No difference; underpowered
		Lee <sup>48</sup> 2002	RCT (2/5)	Within 3 days	32/616	53/566	RR 0.55; 95% CI: 0.36, 0.85	Decreased p<0.05
	MD teletriage versus no teletriage	McKinstry 2002 <sup>50</sup>	RCT (2/5)	Within 14 days	194, mean 0.6 SD 0.8	194, mean 0.4 SD 0.7	WMD 0.20 95% CI: 0.05, 0.35	Increased p<0.05
RN teletriage versus MD visits	Richards <sup>49</sup> 2002	TSS (n/a)	Within 28 days	3,452, mean 1.24 SD 1.78	1,233, mean 0.93 SD 1.30	WMD 0.31 95% CI: 0.22, 0.40	Increased p<0.05	
Subsequent health services use: repeat telephone calls	RN versus MD teletriage	Lee <sup>48</sup> 2002	RCT (2/5)	Within 3 days	23%	13%	10.4% difference; 95% CI: 5.8%, 14.5%	Increased P<0.05
	MD teletriage versus no teletriage	McKinstry 2002 <sup>50</sup>	RCT (2/5)	Within 14 days	194, mean 0.0 SD 0.25	194, mean 0.0 SD 0.1	WMD 0.0 95% CI: -0.04, 0.04	No difference
Safety: subsequent hospitalizations	RN versus MD teletriage	Lattimer <sup>47</sup> 1998	RCT (2/5)	Within 3 days	428/7,184	507/7,308	RR 0.86 95% CI: 0.76, 0.97	Decreased p<0.05
		Thompson <sup>46</sup> 1999	RCT (2/5)	Within 3 days	5/100	8/123	RR 0.77; 95% CI: 0.26, 2.28	No difference; underpowered
Safety: subsequent ED visits	RN versus MD teletriage	Lattimer <sup>47</sup> 1998	RCT (2/5)	Within 3 days	412/7,184	398/7,308	RR 1.05 95% CI: 0.92, 1.21	No difference
		Thompson <sup>46</sup> 1999	RCT (2/5)	Within 3 days	3/100	2/123	RR 1.84 95% CI: 0.31, 10.83	No difference; underpowered
		Lee <sup>48</sup> 2002	RCT (2/5)	Within 3 days	45/616	47/566	RR 0.88 95% CI: 0.59, 1.30	No difference
	MD teletriage versus no teletriage	McKinstry 2002 <sup>50</sup>	RCT (2/5)	Within 14 days	194, mean 0.0 SD 0.1	194, mean 0.0 SD 0.1	WMD 0.0 95% CI: -0.03, 0.03	No difference
	RN teletriage versus MD visits	Richards <sup>49</sup> 2002	TSS (n/a)	Within 28 days	3,452, mean 0.03 SD 0.19	1,233, mean 0.01 SD 0.10	WMD 0.02 95% CI: 0.01, 0.03	Increased p<0.05
Safety: deaths	RN versus MD teletriage	Lattimer <sup>47</sup> 1998	RCT (2/5)	Within 7 days	58/7,184	67/7,308	RR 0.88 95% CI: 0.62, 1.25	No difference
		Thompson <sup>46</sup> 1999	RCT (2/5)	Within 7 days	2/100	2/123	RR 1.23 95% CI: 0.18, 8.58	No difference; underpowered

n/a=not applicable, SD=standard deviation

**Table 4:** Calls managed via teletriage by type of professional (self-care and informal care)

Study	Design	Quality	Calls Managed Via Teletriage	Total Calls	Calls Managed Via Teletriage (%)	Comments
<b>Practice MDs Triaged Calls</b>						
McKinstry <sup>50</sup> 2002	RCT	2	140	194	72.2	
Thompson <sup>46</sup> 1999	RCT	2	76	123	62.0	No difference compared to RN (59%)
Lattimer <sup>47</sup> 1998	RCT	2	3,629	7,308	50.0	No difference compared to RN (50%)
Lee <sup>48</sup> 2002	RCT	2	281	566	49.6	No difference compared to RN (51%)
Cragg <sup>44</sup> 1997	RCT	1	216	1,046	20.7	Compared to deputizing MD (1.4%)
<b>Mean</b>					<b>50.9</b>	
<b>Deputizing MD Triaged Calls</b>						
Cragg <sup>44</sup> 1997	RCT	1	15	1,106	1.4	Compared to practising MD (20.7%)
<b>NP Triaged Calls</b>						
Elwyn <sup>52</sup> 1999	PPS	n/a	n/r	n/r	17.0	Limited types of health problems; no children <5 years old
<b>RN Triaged Calls</b>						
Thompson <sup>46</sup> 1999	RCT	2	59	100	59.0	+19% then managed by MD teletriage
Lee <sup>48</sup> 2002	RCT	2	315	616	51.1	No difference compared to MDs (49.6%)
Lattimer <sup>47</sup> 1998	RCT	2	3,581	7,184	50.0	+15% then managed by MD via teletriage
O'Connell <sup>10</sup> 2001	PPS	n/a	2,429	6,178	39.3	
Richards <sup>49</sup> 2002	TSS	n/a	890	3,488	25.5	
<b>Mean</b>					<b>45.0</b>	

n/a=not assessed; n/r=not reported

**Table 5:** Satisfaction with teletriage services

Study		Cragg <sup>44</sup> 1997	Darnell <sup>51</sup> 1985	Lee <sup>48</sup> 2002	O'Connell <sup>10</sup> 2001	McKinstry <sup>50</sup> 2002
Instrument		Satisfaction with off-hours primary care	n/r	n/r	n/r	Patient enablement instrument
Reliability and validity measured		Yes	n/r	n/r	n/r	n/r
Scale for rating items		5 point scale	n/r	5 point scale	5 point scale	5 point scale
Timing (from teletriage consultation, unless otherwise identified)		Within 3 days	18 months post-program implementation	Within 3 days	Within 1 week	Within 1 week
Method of data collection		Via telephone interview				Via mail
<b>Items</b>						
Overall	Overall satisfaction	X		X	X	
Quality of interaction	Satisfied with communication	X				
	Feel you were able to explain your problem					X
	Satisfied with attitude of doctor	X	X	X		
	Think your problem was understood				X	X
	Problem explained to you					X
	Treatment of problem explained to you					X
Continuity	Satisfied with continuity of care	X				
Timing	Satisfied with delay until in-person visit	X				
	Satisfied with length of time to respond		X	X		
	Satisfied with length of telephone consultation		X	X		
Quality of care	Satisfied with care provided and advice given		X	X		
	Satisfied with thoroughness and competence of practitioner			X		
Re-use	Willingness to use telephone service again				X	X
Other	Increased positive feelings for health coverage				X	
	Know the doctor you saw			X		X

n/r=not reported

**Table 6:** Summary of satisfaction results

Study	Design	Quality	Instrument	Response Rate	Main Intervention Satisfaction Score		Comparison Satisfaction Score		Statistically Significant Difference
Cragg <sup>44</sup> 1997	RCT	1/5	Satisfaction with after-hours primary care	71%	Deputizing MD teletriage	61.8%	Practice MD teletriage	70.7%	P<0.05 for overall satisfaction and for 3 of 4 items (communication, attitude of MD, delay to visit)
Darnell <sup>51</sup> 1985	RCT	1/5	n/r	n/r	Practice MD teletriage	78%	ER visit	n/a	No comparison
Lee <sup>48</sup> 2002	RCT	3/5	n/r	98.8%	RN teletriage provided by independent service	55%	Practice MD teletriage	68.5%	P<0.05 for overall satisfaction and for 4 of 5 items (thoroughness, length of wait, medical advice, length of consultation,)
O'Connell <sup>10</sup> 2001	Pre-post	n/a	n/r	64%	RN teletriage provided by independent service	> 90%	MD visit	n/a	No comparison
McKinstry <sup>50</sup> 2002	RCT	2/5	Patient enablement instrument	54.4%	59% who received MD teletriage willing to use it again		50.6% who received MD visit willing to use teletriage		No difference on 6 of 6 items.

n/r=not reported; n/a=not assessed

## 5.3 Discussion

Our systematic review found that little research has been done in teletriage. Most of the research has been conducted in the US or the UK and reported within the last five years. Conclusions about the effects of teletriage are limited by variability in the characteristics of interventions, settings, methodological quality, comparison interventions and practitioners involved. The studies of highest methodological quality, with minimal threats to internal validity, compare RN to MD teletriage<sup>46-48</sup> and MD teletriage to standard practice without teletriage.<sup>50</sup>

The 10 included studies consistently demonstrate that teletriage for health problems decreases immediate practitioner visits without increasing adverse outcomes such as subsequent hospitalizations, ED visits and deaths. These studies also found that about half of the calls for health problems could be managed via the telephone alone rather than requiring an in-person consultation. Less is known about the impact of teletriage on immediate ED visits, subsequent contact with personal practitioners, general health-related quality of life or the impact of additional resources (e.g. self-care booklets). Callers' satisfaction with teletriage services ranges from 54% to 90%.

### 5.3.1 Consistent effects

The most consistent benefit was the impact on immediate practitioner clinic or home visits. The magnitude of the benefit depended on the profession of the practitioner providing telephone advice and the setting in which it was delivered. For most group practice RN teletriage, the volume of immediate MD clinic or home visits was reduced by 17% to 42%.<sup>46,47,49,52</sup> In a health plan call centre setting, there was a more conservative decrease in face-to-face contact, with the higher effect observed in continuously enrolled members.<sup>10</sup> Finally, there was an increase in face-to-face visits when teletriage was provided by deputizing MDs.<sup>44</sup>

About half of the calls for health problems could be managed with telephone advice alone by RNs or practice MDs. The smaller effect for NPs could have been influenced by the fact that they could arrange to see callers in a clinic setting and that included calls were limited to five health problems (e.g. sore throat).<sup>52</sup> For situations involving deputizing MDs, there may not have been any disincentives for in-person consultations.<sup>44</sup> The lack of familiarity with the practice population and therefore, reticence to give advice without seeing the client, may also have influenced the decision of deputizing MDs to see callers in person.

Over half of callers were satisfied with the teletriage provided by practitioners. Compared to RN teletriage at an independent call centre, Lee<sup>48</sup> found that callers were more satisfied when teletriage was provided by group practice MDs. Similar findings were observed in another RCT that compared teletriage provided by deputizing MDs to that of group practice MDs.<sup>44</sup> Given the minimal number of calls that were managed over the telephone alone,<sup>44</sup> however, these results were not as comparable with other studies. Finally, the comparisons of satisfaction results between studies were complicated by the lack of valid and reliable measurement tools, lack of consistency in tools used and low response rates for most studies. The evaluation of satisfaction with teletriage services could be improved through the use of a valid, reliable and standardized instrument designed for teletriage, such as the satisfaction with off hours in primary care scale.<sup>54</sup>

### 5.3.2 No evidence for adverse effects

No evidence showing the negative impacts of the teletriage intervention was found, with respect to <sup>46,47,51</sup>adverse effects such as subsequent hospitalizations<sup>46,47</sup> and deaths.<sup>46,47</sup> The Thompson<sup>46</sup> RCT, however, was underpowered to detect within-trial equivalence on these outcomes. The Lattimer<sup>47</sup> RCT demonstrated a decrease in hospitalizations within three days for callers managed by RNs compared with MDs, but the interpretation depended on whether these “missing” hospitalizations on average would have benefited or harmed callers.

Teletriage did not increase subsequent visits to the ED within three to 14 days of the initial call in four studies.<sup>46-48,50</sup> A fifth study by Richards,<sup>49</sup> which monitored callers for up to four weeks, did not explain the reasons for the small but significant increase in subsequent ED visits. It was difficult to determine if these visits were related to the initial teletriage call. Alternatively, three days, as measured in three studies,<sup>46-48</sup> may be too short a follow-up period to be a useful outcome measure.

### 5.3.3 Unclear results

The impact of teletriage on immediate ED visits (within 24 hours of the call) is less clear. Decreases are observed in two non-RCT studies for which teletriage in call centres was “required” before going to an ED.<sup>10,43</sup> In a study by Franco,<sup>43</sup> for ED visits to be paid by the insurer, clients had to contact the MD-NP teletriage service before visiting an ED. This gatekeeper role is likely to be a factor that influenced the decrease in ED use. The interpretation of the results in the CCS,<sup>43</sup> however, is limited by the statistically significant differences in the characteristics of the two groups that were not controlled for in the analysis.

When teletriage was provided as an “optional” service in the Darnell<sup>51</sup> RCT, there was no difference in ED visits. Possible reasons for this effect were the optional feature of the service, continued referral of callers to the ED after the teletriage MD was contacted and low use of the telephone, especially early in the study. Callers identified reasons for proceeding to the ED without calling the teletriage service as “feeling too sick” or “not able to find the telephone number.” This trial was reported 18 years ago and the use of telephone services for health problems may be more acceptable to the public now. More research is required to determine the impact of teletriage on immediate ED visits.

It is unclear whether teletriage reduces visits to practitioners or delays these visits. Of the five studies that evaluated subsequent practitioner visits, the McKinstry RCT<sup>50</sup> that evaluated MD teletriage and the Richards TSS<sup>49</sup> that evaluated RN teletriage found increases in the number of clinic visits in the subsequent two to four weeks. Three RCTs, in which teletriage was provided by a deputizing MD<sup>44</sup> or RNs<sup>46,48</sup> and compared to teletriage provided by practice MDs, found no difference in MD visits within the subsequent three to 14 days. The reason for increases in subsequent visits for the two studies is unclear. One explanation is that follow-up with personal practitioners was suggested to callers by RNs and MDs providing teletriage. Further evaluation is required to determine if the reasons for subsequent visits were unresolved problems, associated psychosocial issues or directions from the teletriage consultation.

### **5.3.4 Compared to other reviews**

The results of our review are comparable to those of a previous rapid review<sup>34</sup> and systematic review<sup>35</sup> of RN telephone consultation. Our review expands the definition of practitioner to include physicians and we include a wider range of study designs. The role of the telephone services is more clearly defined as providing, at a minimum, teletriage. These findings are also consistent with those of another systematic review by Leibowitz<sup>55</sup> identified during the final editing of this report. The third review focuses on the effectiveness of six methods used to provide after-hours care.

### **5.3.5 Limitations**

There are three limitations of our systematic review.

Of the 10 included studies, we consider only four to be of a higher methodological quality (Jadad scores of  $\geq 2$  and adequate allocation concealment). The other studies are rated as being of poorer methodological quality (Jadad score  $< 2$ ; Newcastle-Ottawa  $< 3$ ; analysis not controlling for potential threats to internal validity). Some studies have higher rates of loss to follow-up and low response rates to the satisfaction questionnaires.

Variability in the results for teletriage provided by RNs (particularly the quality of the interaction) is likely to be influenced by the use and quality of clinical protocols, documentation systems, orientation, continuing education and quality assurance programs.<sup>20,36</sup> It is difficult to determine whether these key program elements were implemented as intended, what their influence on study results was and how comparable they were across programs.

There is a lack of knowledge about the impact of teletriage on the psychological outcomes for callers. Included studies focus on outcomes related to physical health such as hospitalization, subsequent ED visits and deaths.

## 6 REVIEW OF ECONOMIC STUDIES

### 6.1 Methods

#### 6.1.1 Data extraction strategy

Two reviewers (DR and HN) independently extracted relevant data using a standard form (Appendix 6). Results were compared, with differences resolved by consensus. The data extraction form is a variation of one developed for another CCOHTA review.

#### 6.1.2 Quality assessment

Two reviewers (DR and HN) independently assessed the quality of the included studies using the Haycox and Walley checklist.<sup>56</sup> This checklist explores the quality using 10 criteria (Table 7). The version used is adapted for Whitten *et al.*<sup>57</sup> A variant is reproduced in *MeReC Briefing* 2000;(14).<sup>58</sup>

#### 6.1.3 Data analysis methods

Data synthesis involved collating and summarizing the information extracted from the included studies. The main clinical results are summarized in section 5.2 and Table 1. The results were not pooled quantitatively, given the variation in study characteristics.

## 6.2 Results

### 6.2.1 Study characteristics

Three primary studies satisfy the relevant quality criteria for the limited cost analysis undertaken (Table 7). We have not found other reviews of economic assessments of teletriage programs. The one review of economic studies of telehealth projects (Whitten *et al.*)<sup>57</sup> was irrelevant.

Richards<sup>49</sup> examined the effect of RN teletriage during office hours in a UK MD group practice. Lattimer<sup>53</sup> examined the effect of RN teletriage after hours in a UK MD group practice. The O'Connell<sup>10</sup> PPS examined the effect of RN teletriage during and after hours in a US call centre. No published Canadian studies were identified. The three studies computed the impact on costs for the insurer when teletriage was added to existing services. These studies quantified caller diversion when RNs use clinical protocols to direct callers to appropriate health services. RNs providing teletriage was the new service in each case.

The Richards<sup>49</sup> PPSs varied the pre-post design by having three sites and introducing the teletriage intervention sequentially. In addition to using a pooled pre-post design, Richards employed repeated measures before and after the introduction. This allowed them to use time series methods to test for trends, seasonality or events that might affect costs.

**Table 7: Quality assessment of the economic analysis**

<b>Criterion</b>	<b>Lattimer<sup>53</sup> 2000</b>	<b>O'Connell<sup>10</sup> 2001</b>	<b>Richards<sup>49</sup> 2002</b>
1. Presence of clear hypothesis; aim of study comprehensively described and relevant to real world	Yes. Aims well described, relevant. Hypothesis implied but clear: teletriage reduces costs.	Yes. Aims well described, relevant. Hypothesis implied but clear: teletriage reduces costs.	Yes. Aims well described, relevant. Hypothesis implied but clear: teletriage reduces costs.
2. Presence or absence of clear statement regarding perspective from which cost is assessed	Yes. Limited NHS expenditure (excludes privately borne costs)	Yes. Health plan expenditure (excludes privately borne costs)	Yes. NHS expenditure for MD and RN workload, (excludes privately borne costs)
3. Methods	Appropriate. Pre-post test study with cost impact analysis	Appropriate. Pre-post test study with cost impact analysis	Appropriate. RCT
4. Presence or absence of comparator and whether appropriate	Present and appropriate. Pre-implementation service patterns and costs	Present and appropriate. Pre-implementation service patterns and costs. Interviews conducted to identify possible confounding factors	Present but not ideal. Compares presenting populations rather than event rates. Pre-implementation service patterns and costs. Intermittent data collection and sequential introduction of service
5. Is quality of medical evidence adequate?	Not relevant. Excess mortality ruled out	Not relevant.	Not relevant.
6. Are appropriate costs considered?	Yes.	Yes.	Yes. Inclusion of subsequent ED visits up to 28 days after teletriage call is a questionable feature
7. Are appropriate benefits considered?	Benefits assumed to be unaffected. No evidence of equivalence presented	Benefits assumed to be unaffected. No evidence of equivalence presented	Benefits are assumed unaffected. No evidence of equivalence presented
8. Is marginal analysis undertaken?	Not appropriate.	Not appropriate.	Not appropriate.
9. Has sensitivity analyses been undertaken?*	Yes. Standard deviations for utilization estimates reported. Costs calculated using upper and lower confidence limits for savings	Yes, using cost estimates based on high and low impact sub-populations. Interval estimates not reported.	Yes. Standard deviations for utilization changes reported.
10. Is analysis appropriate to Canadian environment?	Cost calculations cannot be used because of institutional differences. Diversion rates may be applicable with caution	Cost calculations cannot be used because of institutional differences. Diversion rates may be applicable with caution	Cost calculations cannot be used because of institutional differences. Diversion rates may be applicable with caution

\*Marginal cost is not strictly defined for these experiments.

Cost-effectiveness calculations are made on the assumption that the clinical outcomes are not changed. Lattimer provides evidence of safety elsewhere (Lattimer 1998).<sup>47</sup>

Lattimer<sup>53</sup> used data from a large (14,000 calls) RCT. Randomization was implemented by identifying matched after-hours periods and diverting all calls away from the group practice MDs to RNs for a randomly selected day in each matched pair. A consequence arising from the design was that clients may not adapt to the new regime. Reported results may differ in a fully implemented system supported by client education.

### **6.2.2 Economic results**

The economic results must be understood in the context of the delivery model that shapes all three studies. For each, there is a population (Lattimer<sup>53</sup> 97,440, O'Connell<sup>10</sup> 57,673, Richards<sup>49</sup> 20,800) and a unchanging process that causes a sub-population of individuals to present themselves for conventional medical care. The process has at least two components – one that produces symptoms and one that produces the individual's decision to present himself or herself to the health care system. All three studies assume that introducing RN teletriage does not affect either component. The O'Connell<sup>10</sup> PPS refers to a change in the population mix during the study and the Richards<sup>49</sup> TSS notes without explanation a difference in presenting symptoms during the triage segment of the study.

The assumption that making telephone consultations easier will not affect behaviour may be erroneous. The most natural assumption for an economist is that reducing the effective cost of information will lead to increased requests for consultation. It follows that the appropriate cost comparison is between total usage across the enrolled population before and after teletriage is introduced<sup>10</sup> and not between presenting populations before and after the introduction of teletriage.<sup>49,53</sup>

Teletriage will have positive and negative effects on costs. In the presence of opposing effects, teletriage would have an indeterminate impact on costs. This is what the Richards<sup>49</sup> TSS found for teletriage during office hours. Teletriage reduced the proportion of callers managed by MDs from 89.6% to 59.5%. The length of in-person consultations by MDs referred by teletriage increased by 5%, from 8.12 to 8.51 minutes. Longer consultations with clients who more clearly needed to see an MD are the predicted and desirable result, if clients who do not need to consult MDs are diverted.

The Richards<sup>49</sup> TSS reports a reduction in MD time of 28.3% (2.45 minutes per client) (Table 8) and an increase of RN time of 500% (4.15 minutes per client). Including increased ED and return visits, the net cost of office-hours teletriage is estimated to be UK£1.48 per client presenting (95% CI: UK-£0.19, UK£3.15). Triage during office hours is reported as cost neutral. Unexplained differences in presenting symptoms account for UK£0.69 of the UK£1.48 estimated net cost of triage per client.

This result may be sensitive to the relative price of MD and RN time (the higher the relative price of MDs, the greater the savings).

**Table 8:** Changes in MD contact due to teletriage (Richards<sup>49</sup> 2002)

Management Outcome	% Clients, Standard Treatment	Change in Percentage with RN Triage	Change in MD Minutes per Client	Change in RN Minutes per Client
MD telephone	11.3	-4.8	0.77	2.23
MD office visits	64.0	-23.2	0.39	4.11
MD home visits	14.3	-2.2	-1.04	3.39
Total handled by MD	89.6	-30.3	-2.45	4.15

Calculations by DR based on Table 2 column 5 in the electronic version of the paper by Richards<sup>49</sup> 2002.

Unexpected and unexplained increases in subsequent ED visits increased the estimated cost per client in the Richards<sup>49</sup> TSS. ED visits increased from 1% to 3.3% of callers in the 28 days after teletriage (a change of 2.3%; 95% CI: 1.5, 3.2.) Although a small number of events were observed, the cost effect was larger than the calculated value of MDs' time saved by teletriage (UK£2.25 versus UK£2.01). This was an unusual and questionable result in the study.

After-hours teletriage provides an alternative to ED visits or the services of on-call MDs. The Lattimer<sup>53</sup> RCT reports that “the greatest impact on the results of the cost analysis was generated by cost for emergency hospital admissions.” Unlike the other two studies, this trial does not count the value of MDs' time saved, because MDs are salaried. For example, a reduction in teletriage contact with MDs during the RCT is reported in an earlier paper using the same data.<sup>47</sup> Thus, the Lattimer<sup>53</sup> RCT underestimates the savings that would occur under most Canadian conditions. Table 9 provides a calculation showing plausible annualized effects that are based on those in the earlier paper.

Reduced use of the ED may not be the largest source of savings if the value of MD time saved is included. There is an additional source of savings in the Lattimer<sup>53</sup> trial, because the number of short stays in hospitals is reduced for adults and children.

**Table 9:** Changes in MD contact due to teletriage (Lattimer<sup>47</sup> 1998)

Management Outcome	Median Weekly Difference (95% CI for median change)	Median Change on Base as Percentage*	Annualized*	Change in Utilization per 1,000 Members/year*
Calls managed with MD teletriage alone	-91/132 (-100 to -82)	-68.9	4,732	-4.9
Callers' MD office visits	-23/68 (-36 to -18)	-33.8	1,352	-1.4
Callers' MD home visits	-17.5/66 (-23 to -10)	-26.0	910	-0.9

\* Calculations by DR based on “Table 5: Management outcome of calls in paired comparison within randomisation blocks of two weeks of weekly contacts,” from the paper by Lattimer<sup>47</sup> 1998.

The O’Connell<sup>10</sup> PPS examined 24/7 RN teletriage as the principal contact for all clients in a US health insurance plan. Some clients were enrolled in an HMO. This study was the most relevant to the Canadian context. Cost savings were calculated based on utilization rates for 44% of plan members who were continuously enrolled and the 56% who were members for part of the study period. There were reductions in ED and MD visits for all four quarters of the program year

relative to the baseline year. MD and ED utilization rates for continuously enrolled members were affected more than those of members who were not continuously enrolled (Table 10). The return on investment (HMO estimated savings divided by HMO expenditure) for all members was conservatively calculated at US\$2.03 using the changes in utilization observed for continuously enrolled members and at US\$1.33 for members not continuously enrolled.

**Table 10:** Impact of RN teletriage on ED visits (O’Connell<sup>10</sup> 2001)\*

Sub-population	Change in ED Utilization per 1,000 Members/Year	Change in MD Utilization per 1,000 Members/Year
Continuously enrolled	-4.3	-5.4
Not continuously enrolled	-1.6	-3.8

\*Calculations by DR

## 6.3 Discussion

No Canadian studies were found. The two UK and one US studies are limited to assessing the effect on NHS or HMO budgets. The simple payer perspective is justified for these studies by its relevance for health care decision makers. If projects pass the limited cost test applied and if there are no negative effects, as assumed, the projects will pass the test that includes benefits and client-caller costs.

Given that actual unit costs in Canada may differ from those used in these three studies, the results should be applied cautiously to the Canadian context. The O’Connell<sup>10</sup> PPS seems to be most reflective of the Canadian situation, while the Richards<sup>49</sup> TSS is least applicable. Furthermore, the presence of after-hours clinics may reduce savings, if clinics are less expensive than ED visits.

The evidence from the three studies shows that cost savings are significant for after-hours teletriage in the UK and US. These savings result from the diversion of clients from ED and MD services. Teletriage during office hours alone may not be cost-effective if there is a long-term increase in ED visits.

There are four points to make about the application of the economic evidence in the studies examined to the Canadian context. First, teletriage is not a medical procedure; it is an administrative innovation that channels potential clients to the appropriate health services. It resembles a change in the signs used in a hospital or the publication of information pamphlets. The standards of evidence required for making administrative changes may be less stringent than those required for clinical procedures.

Second, the limited cost analysis, as represented by these studies, ignores client and MD cost savings and other benefits. Bearing the probable bias in mind, an administrator might be justified in adopting teletriage even without a high level of confidence that direct payer costs will decrease.

Third, it seems likely that caller satisfaction would increase (quality of service would improve) and that client risks due to access limitations, delay or iatrogenic misadventure would decrease (quality of care would increase). If either of these are expected, then implementation of the procedures may be justified at positive cost.

Finally, the evaluation of experimental interventions is a proxy for the evaluation of the program after it has undergone refinement. Ideally, the best version of teletriage would be compared to the most effective and efficient system without teletriage. This ideal test is unfeasible.

# 7 SURVEY OF CANADIAN TELETRIAGE PROGRAMS

## 7.1 Methods

### 7.1.1 Survey design and sample

Teletriage programs and key contacts across the jurisdictions were identified through referral by members of Canadian Coordinating Office for Health Technology Assessment (CCOHTA) advisory committee on devices and health systems (representing nine provinces at the time of study design) and from a list of contacts compiled by members of the federal-provincial-territorial (FPT) initiative on call centre programs.

The questionnaire was based on a previous survey coordinated by representatives from seven provinces and territories (BC, AB, Saskatchewan (SK), MB; Yukon (YT), Northwest Territories (NT) and Nunavut (NU)). A draft questionnaire was pilot-tested by the BC call centre program to establish content validity. The questionnaire was subsequently refined.

The final questionnaire, accompanied by an introductory message and information sheet detailing the survey rationale, was sent to the jurisdictional representatives identified (Appendices 7 and 8). The representatives were given two weeks to complete the survey and follow-up was undertaken to ensure participation by all jurisdictions. The QC program received the questionnaire in both official languages at the request of the program representative. If necessary, participating jurisdictions were contacted during data analysis to clarify the survey responses. Program evaluation data were examined by two reviewers (HN and DR).

## 7.2 Results

### 7.2.1 Overview of Canadian initiatives

All 13 provincial and territorial jurisdictions completed the survey (100% response rate). Six of the 13 provide call centre programs for residents in their jurisdiction; these include BC (BCNurseLine), AB (Health Link), MB (Health Links), ON (Telehealth Ontario), QC (Info-Santé) and NB (Tele-Care). SK officially launched their teletriage service on September 10, 2003<sup>59</sup> and Nova Scotia (NS) plans to implement a call centre program within two years. The five jurisdictions without programs are Prince Edward Island (PE), Newfoundland (NL), YT, NT and NU.

### 7.2.2 Jurisdictions with call centre programs

#### a) *Characteristics of call centre programs*

All six programs are jurisdictional in nature; the size of populations served ranges from 730,000 (NB) to 12 million (ON) (median of 3.5 million) (Table 11). Saskatchewan's teletriage service (HealthLine) is not considered in this section given that it was implemented after completion of the survey of Canadian call centres. The start date for service delivery ranges from July 1994

**Table 11: Characteristics of call centre programs**

<b>Jurisdiction (program, start date)</b>	<b>Population Size (in millions)</b>	<b>Intervention</b>	<b>Hours</b>	<b>Call Before Seeking Care</b>	<b>Services Provided</b>	<b>Clinical Protocols</b>	<b>Nursing Orientation</b>
BC (NurseLine, 2001)	4.1, province-wide	RN triage (self-care handbook; Internet health resources)	24/7	No	Triage; acute symptom management; coaching for self-care; health information; links to Internet sites; handbooks; patient decision aids; mail-out; referrals to MD offices, nurse-led centres and other services; link to ED services; other services	Yes; purchased, then customized from Healthwise Inc. (Boise, Idaho); integrated into documentation	105 hours, plus 3 months coaching
AB (Health Link, 2002)	3.0, province-wide	RN triage (Internet health resources)	24/7	No	Triage; acute symptom management; coaching for self-care; health information; links to Internet sites; mail-out; referrals to MD offices, nurse-led centres, other services, home care and new patients; link to ED services; other services	Yes; purchased, then customized from HealthLine Systems (US); integrated into documentation	155 to 194 hours over 4 to 5 weeks
MB (Health Links, 1994)	1.0, province-wide	RN triage	24/7	No	Triage; acute symptom management; coaching for self-care; health information; coaching for callers; patient decision aids; mail-out; referrals to MD offices, nurse-led centres, other services, home care; link to ED services	Yes; purchased and used from Ambulatory Innovations Inc. (Indianapolis, Indiana); used by staff as desk reference	40 hours
ON (Telehealth Ontario, 2001)	12.0, province-wide	RN triage	24/7	No	Triage; acute symptom management; referral to other services; link to ED services; other services	Yes; purchased and used from HealthLine Systems (US); integrated into documentation	3 full weeks (112.5 hours)
QC (Info-Santé CLSC, 1995)	7.2, province-wide	RN triage	24/7	No	Triage; acute symptom management; coaching and counselling for self-care; chronic disease management; health information; referrals to MD offices, nurse-led centres, other services and home care; link to ED services; other services	Yes; developed on their own; integrated into documentation	40 hours over 5 days
NB (Tele-Care, 1997)	0.73, province-wide	RN triage	24/7	No	Triage; acute symptom management; coaching for self-care; health information; referrals to MD offices, nurse-led centres, other services; link to ED services; other services	Yes; purchased, then customized from HealthLine Systems (US); integrated into documentation	150 hours

(MB) to September 2002 (AB). All programs state their objectives. Common objectives are to facilitate the use of the most appropriate health services by residents of the jurisdiction, to reduce pressure on the health care system (e.g., reduce inappropriate use of emergency services) and to improve the client's level of decision-making based on health-related information (Table 12).

**Table 12: Objectives of call centres**

Jurisdiction	Objectives
BC	Promote self-care activities to enable people to make wise health decisions; promote more appropriate utilization of MD, health care, emergency and other first responder resources; reduce pressures on ED; and reduce costs.
AB	Client-consumer-patient: support and enable Albertans to access credible health advice and information and to make appropriate choices about health, wellness and care decisions in a timely manner. Provider: support providers by creating channels for accessing evidence-based information and resources; enable timely communication between patients and health providers and enhance capacity of health providers and their practices. Regional, inter-regional, provincial jurisdictions: support and enhance access to health services and health information across province; improve quality of health services and health information; support appropriate management and utilization of health resources; and support fiscal accountability and appropriate allocation of health resources.
MB	Provide callers with problem assessment, accurate health information and assistance with resource identification and referral; staff telephone service using specially educated RNs; build links with community-based group and individual providers, governmental agencies and other institutions; increase profile of [call centre] to staff, volunteers, community, public, other care and service providers and funders; assist callers in overcoming barriers and aid them to navigate health care system; provide health promotion, health education, support and reassurance to callers at most opportune time (during initial call or during follow-up call); provide centrally coordinated route to health care information and services for public and other health professionals; help identify unmet health care needs for use in planning and development of future programs and services; and collaborate with other health care providers.
ON	Improve access to most appropriate health service; improve access to health information and advice; improve health education to the public; improve consumer satisfaction. <sup>60</sup>
QC	Make individuals more self-sufficient in taking charge of health and well-being of themselves and their loved ones; guide people through increasingly complex health and social system; and reduce inappropriate use of services, particularly emergency medical and social services.
NB	Increase awareness, acceptance and understanding of Tele-Care Services by health care providers and public; promote appropriate use of Tele-Care; increase public's capacity for self-care for selected non-urgent conditions by providing information on how to manage symptoms more appropriately; and contribute to cost-effective use of health care resources.

All programs operate 24/7 and none requires callers to contact them before attending an ED or drop-in clinic. Three programs (BC, MB, NB) provide follow-up calls routinely, as needed or during program evaluation. All programs offer teletriage services; symptom management for acute illnesses; provision of health information; referral to other health services such as public health; and link to emergency services in their jurisdiction. Five programs (BC, AB, MB, QC, NB) also offer referral to MD offices or RN-led health centres. Four programs (BC, AB, ON, QC) offer other services such as aboriginal health advice and multilingual consultation.

Additional services include:

- direct linking to ambulance and poison control (BC)
- a centralized telephone line for addiction services (AB)
- bilingual service and telephone lines for poison information, rabies, West Nile virus, prenatal benefit information, and effective April 2003, a problem gambling helpline, an organ and tissue donor screening line and a tele-library (NB).

None of the programs offers referral to MDs accepting new clients. All programs document calls on the computer and the QC program also documents calls on paper forms. None of the programs send a copy of the documentation to the caller's personal practitioner.

**b) Clinical protocols**

All programs used clinical protocols (Table 11). Five programs (BC, AB, MB, ON, NB) purchased their protocols from US vendors with or without customization. Three programs (AB, ON, NB) bought protocols from HealthLine Systems, US. The QC program developed its own protocols. All the clinical protocols were considered, by those in the programs, to be evidence-based, with five programs (BC, AB, MB, QC, NB) also relying on expert opinion for their protocol design and customization. Two programs (QC, NB) sought input from their program committee and clinical team during protocol design and customization.

Five programs (BC, AB, ON, QC, NB) have a process for updating protocols, which are integrated into the documentation-triage systems. The MB program uses the protocols as a reference for call centre staff. Only the protocols for the BC program include guidance for coaching callers to prepare for discussions about health-related decisions with their practitioners. Survey responses from BC, ON and NB indicate that their RN orientation includes discussion about coaching callers to prepare for making decisions with their practitioners.

**c) Staffing, orientation, ongoing education**

The number of staff employed by the programs varies, with the range of full-time equivalents (FTEs) being just over 12 for MB to 585 for QC (median FTEs=92) (Table 13).

**Table 13: Staffing in call centres**

Jurisdiction	Full-time Equivalents (FTE)						Population Served per FTE
	RNs	MD	Pharmacist	Administrative Staff	Volunteers	Total	
BC	46.0	0.1	0	5.5	0	51.6	77,000
AB	106.0	1.0	0	25.0	0	132.0	23,000
MB	11.2	0.0	0	1.0	0	12.2	82,000
ON	232.1	1.2	0	48.4	0	281.7	43,000
QC	547.0	0.0	0	38.0	0	585.0	12,000
NB	27.0	0.5	0	7.0	0	34.5	21,000

RNs, with a college diploma as a minimum requirement, manage most of the calls. None of the programs identify MDs or pharmacists as staff at call centres.

All six programs provide orientation for staff members that include on-site classes with preceptorship by an experienced RN (Table 11). AB also uses self-directed study. The duration of staff orientation varies by program from 40 hours (MB, QC) to 194 hours (AB).

Two programs provided further details on their orientation schedule:

- QC: All nurses undergo training in the telephone procedure and in the use of the Info-Santé computer application. No standardized training program is applied throughout Québec. The guidelines issued by the Ordre des infirmières et infirmiers du Québec indicate the areas to be covered by training; and state that the duration of training should be at least five days (excluding the computer component, which requires a minimum of two or three days). These guidelines also require that training be followed by a period of clinical supervision, with assessment mechanisms.
- NB: There are a minimum two weeks of classroom lectures and demonstrations of software and clinical resources; an average of one week observation of a preceptor RN processing calls; and one week of constant monitoring by a preceptor.

All programs provide continuing education for call centre staff, including in-service courses on call centre topics and professional development for staff (attendance at conferences and courses). Continuing education at the NB program includes monthly coaching, at least one case study completed by each RN per month, attendance at six in-house or teleconference sessions per year, peer review sessions that improve listening to taped calls and mandatory reading circulated monthly to each RN.

#### **d) Program evaluation**

All programs have strategies to monitor the service quality in their call centres.

Program indicators include:

- monitoring of “response time for calls” (all programs)
- use of self-care and informal care resources and evidence-based guidelines (BC, AB, ON, NB)
- access to other resources (AB, NB, ON).

Indicators related to the caller include:

- satisfaction with services (BC, AB, QC, NB)
- knowledge of the health problem after the call (BC, AB, QC, NB)
- certainty about decision to seek care and change behaviour (AB, BC, NB)
- participation by callers in health decisions (BC, AB)
- appropriateness of teletriage decisions (AB, NB)
- calls managed by telephone advice, self-care or informal care (QC, NB).

Access to service indicators

- ED use (BC, QC, NB).

Other indicators

- unable to help (MB)
- volume and duration of calls (QC)
- calls directed to the ED or medical consultation (QC).

Five of six jurisdictions performed evaluations either during the pilot project (BC, ON, NB) or during the program phase (AB, BC, QC).<sup>15,61-69</sup> The evaluations from the five call centre programs are summarized in Table 14. An evaluation of the NB Tele-Care program is underway by the provincial ministry of health, including an economic assessment being conducted by the Office of the Comptroller.

The provincial ministries of health in three jurisdictions (BC, QC, NB)<sup>15,64,68</sup> undertook evaluations of their pilot projects or full programs. Evaluations for AB and ON<sup>62,63</sup> were conducted by independent research groups. Over 50% of the calls were made on behalf of someone else, most often, for a sick or injured child.<sup>63,64,68</sup> The most common calls were for cold and flu symptoms and respiratory tract infections.<sup>63,68</sup>

Evaluation reports from the five programs demonstrated a high rate of satisfaction with the call centre program (range of 86% to 99%)<sup>15,62-64,68,69</sup> and a trend for callers to use more self-care and informal care<sup>15</sup> (BC). Four jurisdictions (BC, AB, ON, QC) reported a trend towards decreased non-urgent ED visits, with BC, AB and QC reporting reductions in ED visits in the range of -8% to -32%.<sup>15,62,64</sup> The BC program evaluation found that over 7,000 visits to the ED were avoided from April 2001 to May 2003.<sup>61</sup> The NB Tele-Care pilot project was associated with a higher number of non-urgent ED visits.<sup>68</sup> Evaluation reports from five jurisdictions showed conflicting results for utilization of MD visits or walk-in clinics.

Three jurisdictions listed the key strengths of their call centres (Table 15).

#### **e) Costs**

The annual cost estimates of the six call centres vary by program, the range being C\$838,733 (MB) to C\$45 million (ON) (median of C\$7.4 million annually) (Table 16). These estimates include, among other components, staff salaries and costs associated with professional development.

Three jurisdictions (ON, QC, NB) have undertaken economic analyses for their call centres.<sup>63,64,68</sup> Using a public payer perspective, the cost per triage call across the three programs ranges from C\$10 to C\$27 CAD (Table 16).

The NB pilot project evaluation identifies several intangible costs and benefits that affect the value of call centres.<sup>68</sup> Intangible benefits include timely consultation at the ED or walk-in clinic, which would otherwise have been avoided or delayed (e.g., based on the NB evaluation, 10% of persons ultimately referred to the ED by Tele-Care would have otherwise “asked family or friends” or engaged in “watchful waiting”).<sup>68</sup> Intangible costs identified in the NB pilot project evaluation include inappropriate referrals for urgent visits (3% of cases referred to MD office and walk-in clinics should have been sent to the ED).<sup>68</sup>

**Table 14:** Summary of evaluations from call centre programs

Jurisdiction (date of evaluation)	Program Description	Evaluation Design	User Profile	Caller Satisfaction	Self- care	Outcomes		
						ED Visits	Visit to Health Professional	Impact on Health Services
BC <sup>15</sup> pilot- project phase (self-care)  November 1997 to 1999	Pilot project to test efficacy of providing self-care resources and to gather information that would be helpful in implementing larger program.  Available 24/7.  Intervention consisted of: <ul style="list-style-type: none"> <li>• self-care book</li> <li>• RN support line</li> <li>• newsletter every few months with information on seasonal health problems.</li> </ul>	<ul style="list-style-type: none"> <li>• mail survey</li> <li>• telephone interviews</li> <li>• self-care diaries of callers</li> <li>• health support line data medical services plan utilization data</li> </ul> <p>Comparison of initial caller intent (I) versus disposition after call (D).</p>	<p>11,714 households, Capital Health Region of Victoria</p> <p>Expanded to include:</p> <ul style="list-style-type: none"> <li>• 450 foster families</li> <li>• those calling EDs</li> <li>• ~25,000 residents of Southern Gulf Islands.</li> </ul> <p>1,634 calls/year; 67% calls from ED referrals. Follow-up evaluation for 54% of calls. Most callers sought information on managing specific health issue.</p>	86%	+35%  I 20% D 55%	-17%  I 30% D 13%	+7%*  I 4% D 11%	<p>No overall impact on ED visits compared to utilization patterns in previous five years before project.</p> <p>Self-reports by callers support reduced use of non-urgent ED visits.</p>
BC <sup>61</sup> program phase April 2001 to May 2003	Available 24/7.  Toll-free line for deaf and hearing impaired; translation provided in 130 languages.	n/r	<p>7,177 calls in April 2001 to 18,259 calls in May 2003;</p> <p>9,221 first-time callers in May 2003</p>	n/r	n/r	7,444 visits avoided	15,242 visits avoided	<p>Health care system was avoided 12% of calls;</p> <p>over 7% of calls downgraded to less resource intensive health service;</p> <p>over 6% of calls</p>

\*This increase may be primarily attributed to ED referrals whose health status would likely deteriorate over next few days warranting a GP visit.

Jurisdiction (date of evaluation)	Program Description	Evaluation Design	User Profile	Caller Satisfaction	Self- care	Outcomes		
						ED Visits	Visit to Health Professional	Impact on Health Services
								upgraded to more urgent and appropriate level of service.
AB <sup>62</sup> (Capital Health Link) September 2000	Call centre to provide callers with health-related information or advice.  Available 24/7.  RNs answer call, assess caller's needs and provide information or refer to other community resources.	Outcomes: <ul style="list-style-type: none"> <li>users' satisfaction</li> <li>impact on users' health knowledge and behaviour.</li> </ul> 386 callers and 30 health professionals surveyed. Evaluation done in three phases: <ul style="list-style-type: none"> <li>January 2001</li> <li>October to December 2001</li> <li>January to March 2002.</li> </ul> Findings reported for January 2001.	91% of callers used service once;  72% of calls were to seek health advice about specific problem;  22% called for general health information;  54% called on behalf of someone else, most often a family member.	93%  (69% satisfied with time waiting on hold before RNs answered) <sup>†</sup>	91%	-8%	-13% in use of walk-in clinics  +1% in MD visits.  (+10% in treating at home)	Projections for 2001:  over 10,000 fewer visits to ED;  over 16,000 fewer MD visits;  over 5,000 fewer walk-in clinic visits;  (44,000 more callers willing to treat at home)

<sup>†</sup>43.5% of callers said they would be prepared to wait between two to five minutes; 25% would wait five to 10 minutes; and 23% would wait longer than 10 minutes. Only 8% of callers would wait less than two minutes.

n/r=not reported.

Jurisdiction (date of evaluation)	Program Description	Evaluation Design	User Profile	Caller Satisfaction	Self- care	Outcomes		
						ED Visits	Visit to Health Professional	Impact on Health Services
ON <sup>63</sup> (Direct Health teletriage pilot project)  June 1999	To provide RN triage advice and health information services to northern ON (located in North Bay);  <ul style="list-style-type: none"> <li>• bilingual service</li> <li>• available 24/7</li> <li>• northern ON residents</li> <li>• toll-free line.</li> <li>• Direct Health provided with C\$4.9 million grant from northern ON Heritage Fund Corp to establish and operate 22-month pilot project.</li> </ul>	<ul style="list-style-type: none"> <li>• mail surveys</li> <li>• administrative data from vendor</li> <li>• audit of call advice</li> <li>• OHIP claims data.</li> </ul> <p>Information was derived from ~28,000 calls.</p>	<p>Service processed over 101,200 calls during 22 months.</p> <p>Callers more likely to be English- speaking, female, 17 to 49 years of age and married; 84% of callers used service for information or advice for themselves; 71% for their sick or injured child; 63% for a sick or injured adult.</p> <p>57% of calls for symptoms related to poisoning or ingestions of dangerous substances; 54% to 60% for queries on medications; 25% to 27% for minor cuts and bleeding or aches and pains.</p>	94% to 99%	>90%	Trend for de- crease in ED visits <sup>‡</sup>	–	<p>Net cost of pilot project of C\$48,000/ month from government perspective.</p> <p>Including impact of client travel, total cost reduced to C\$20,000/ month.</p> <p>Last 12 months of service: 5,700 calls/ month (design capacity of 8,000 calls/ month). Net monthly costs from C\$147,972 to C\$156,243.</p> <p>Average cost per triage call: C\$18 to C\$27.</p>

<sup>‡</sup>Decrease in ED and GP visits for upper and lower respiratory tract infections and for combined conditions of gastroenteritis plus pneumonia or flu plus upper and lower respiratory infection, otitis or rhinitis. Increase in visits for tension headache and strains and cuts (excluding back).

Jurisdiction (date of evaluation)	Program Description	Evaluation Design	User Profile	Caller Satisfaction	Self- care	Outcomes		
						ED visits	Visit to Health Professional	Impact on Health Services
QC <sup>64</sup> (Info-Sante CLSC)  mid-1995	<ul style="list-style-type: none"> <li>• 24/7</li> <li>• ~7.3 million people have access to program</li> <li>• available in 129 local regions in the QC</li> <li>• RNs provide assessment of problem, information, professional advice and referral to appropriate resource.</li> <li>• not intended to replace more specialized telephone services for particular groups; or handle emergency calls.</li> </ul>	<ul style="list-style-type: none"> <li>• administrative data (1997-1998)</li> <li>• three telephone surveys about awareness and utilization of service (1996, 1997, 1998)</li> <li>• telephone interviews of 4,696 users conducted 48 to 72 hours after their call to service</li> <li>• follow-up of volume of calls and costs of service, using Ministry database containing program's annual financial reports.</li> </ul>	<p>85% of callers are female;</p> <p>~50% of calls concern someone in immediate contact circle;</p> <p>one call in three (33%) concerns a young child (birth to 5 years of age);</p> <p>95% of calls concern a physical problem.</p>	Over 94%	90%	-32%	-8%	<p>1997-1998: 700,000 to 800,000 fewer ED visits;</p> <p>720,000 to 980,000 fewer medical consultations (at ED or elsewhere).</p> <p>1999-2000: 2.3 million calls (316 calls per 1,000). ~400 FTEs. Program cost was C\$32 million or C\$14 per call.<sup>§</sup></p>

<sup>§</sup>In 1997-1998, 17% of callers thought that waiting time was unacceptable, particularly if they had to wait more than five minutes.

Jurisdiction (date of evaluation)	Program Description	Evaluation design	User Profile	Caller Satisfaction	Self- care	Outcomes		
						ED Visits	Visit to Health Professional	Impact on Health Services
NB <sup>68</sup> (TeleCare- Region 1 Pilot) <sup>69</sup>  January 1995	Two-year pilot project established in one health region (South-East and Beauséjour) to test feasibility of teletriage service.  Population of 186,000.	<ul style="list-style-type: none"> <li>• program database</li> <li>• telephone surveys</li> <li>• detailed case information from local EDs</li> </ul>	<p>Over 73,000 calls over two years since January 1995 (i.e., 18% of residents in region);</p> <p>70% of callers are female;</p> <p>41% of callers phoned on their own behalf; 41% on behalf of a child; 13% on behalf of another adult;</p> <p>most common calls relating to children's flu symptoms.</p>	93%	97%	Higher number of visits **	No overall impact on walk-in clinic visits or MD office visits	<p>4,000 calls/ month; over 50% of callers would have used EDs in absence of teletriage service.</p> <p>Utilization of regional EDs: sprains and strains down 45%; cold and flu symptoms down 22%. Increase of C\$618,000 to over C\$1.6 million</p> <p>C\$9.66 to C\$25.29 per triage call compared with C\$32 for ED visit and C\$20 for GP visit.</p>

\*\*Fewer visits related to cold and flu symptoms; abrasions, contusions, scratches; back and neck pain (no injury); otitis media; and post-operative complications. On the other hand, service was associated with more visits for unspecified chest and abdominal conditions, gastroenteritis, suture removal and sprains or strains.

**Table 15: Key strengths of call centres**

Jurisdiction	Key Strengths
AB	<ul style="list-style-type: none"> <li>• 24/7 access</li> <li>• integrated with health regions</li> <li>• smooth handoff and strong partnerships with other services across province</li> <li>• consistent and reliable evidenced-based advice and information (e.g. evidence driven)</li> </ul>
NB	<ul style="list-style-type: none"> <li>• re-direction of patients with certain non-urgent conditions to sources of care other than ED</li> <li>• improved accessibility to 24/7 care for non-urgent illnesses</li> <li>• high levels of public satisfaction with this type of service</li> </ul>
QC	<ul style="list-style-type: none"> <li>• view of users: very high level of satisfaction, good compliance with RN's recommendations, service seen as helpful and reassuring; and obviates need to make a trip</li> <li>• view of social and health system: reduces inappropriate use of resources, increases self-care capacity of individuals and of loved ones caring for a family member</li> <li>• effective in reaching parents of young children (particularly ages zero to five), persons belonging to disadvantaged social strata and persons in ethnocultural communities (except those who do not speak French fluently)</li> <li>• quality of response depends on expertise and clinical judgment of RNs (not on decision algorithms) and on excellent intervention tools (nursing protocols that are strictly validated and continually updated, well designed computer application to support intervention)</li> </ul>

**f) Challenges and collaboration**

Five programs (BC, AB, MB, QC, NB) shared their challenges during planning and implementation of their call centres. These challenges include issues with respect to marketing, advertising and staff recruitment (BC, AB); funding to meet staffing needs given increasing call volumes (MB); and adapting US software clinical content to a Canadian and regional context (BC, NB). These programs also list current challenges and opportunities for improving their call centres including a move towards the integration of teletriage lines (BC, AB), an increase in web resources to promote client access to appropriate information (AB), bilingual issues (MB) and efforts at marketing to maintain a steady growth in call volume (NB).

**Table 16: Cost estimates of call centres**

Jurisdiction	Costs in Canadian Dollars (millions)			Operational Cost per 1,000 Population Served (C\$)*	Cost per Triage Call (C\$)
	Start-up (year)	Operational (year)	Total		
BC	1.7 (2001 to 2002)	6.8 (2002 to 2003)	n/r	1,658	n/r
AB	n/r	n/r	8.1 per year for four years (at two sites)	n/r	n/r
MB	0.064 (1993 to 1994)	0.8 (2002 to 2003)	n/r	840	n/r
ON	n/r	45.0 (2002 to 2003)	n/r	3,750	18 to 27
QC	4.5 (1994 to 1995)	35.1 (2000 to 2001)	n/r	4,875	14
NB	n/r (1997)	3.0 (2001 to 2002)	n/r	4,286	10 to 25

n/r =not reported. \*This assumes that the total population identified is served by the call centre during the period stated.

Three programs (BC, AB, ON) have collaborated with other call centres. BC and AB are collaborating with other jurisdictions by discussing activities such as sharing clinical protocols, discussing core performance measures, exploring the use of telephone service representatives for non-clinical calls and sharing communication strategies. AB is also collaborating with SK regarding the start-up and implementation of a call centre program in SK. All programs list additional services that they would like to offer in their call centres, including chronic disease management and links to Internet sites with more information for callers.

### **7.2.3 Jurisdictions without call centre programs**

During the survey, all seven jurisdictions without call centre programs identified a need for such services. SK subsequently implemented their program in September 2003.<sup>59</sup> NU, PE and NL have begun to discuss the possibilities for a call centre. NL and PE have submitted a joint proposal for self-care and telecare services for the Atlantic provinces through the Primary Health Care Transition Fund. NS plans to initiate a call centre program in 2004-2005, possibly building on the existing program in NB. YT is monitoring “developments in other jurisdictions to determine the feasibility of partnering or participating with another jurisdiction.” NT is exploring the process for program implementation.

Six jurisdictions (YT, SK, NS, NL, PE, NU) propose the establishment of call centre programs with 24/7 coverage. These would provide coaching or counselling for self-care and informal care, health information, referrals to MD office or RN-led health centres and links with emergency services. Five jurisdictions would also offer chronic disease management and referral to other health services such as public health (YT, SK, NS, NL, PE). Four jurisdictions would offer patient decision aids (YT, NT, PE, NL). Four jurisdictions (YT, SK, NS, PE) would also offer multilingual services. Other proposed services include distribution of a self-care handbook to all residents in the NT and having a web site and an audiotape library in PE. NT, NS and NL identified other programs in their jurisdiction including child-health and poison-centre lines.

## **7.3 Limitations**

The following limitations of this survey conducted in Canadian jurisdictions regarding call centre programs have been identified:

- There is minimal evidence about the impact of these programs on health outcomes and the use of health services.
- The programs vary in terms of size and type of organization, experience, resources and scope, making it difficult to compare findings.
- The survey focuses on province- or territory-wide programs providing teletriage services. Call centres operating at the community level in the jurisdictions are excluded.
- This summary is based on self-reported data. Five of six programs have provided program reports, many of which are peer-reviewed.

## 7.4 Summary

Seven Canadian jurisdictions have call centre programs (including the recently implemented program in SK), one (NS) has plans to initiate a program within two years and the other five have identified a need for such programs. The six existing programs reviewed in this section are geographically large in scope, covering most of the population in the jurisdiction. The intervention in all six programs is RN teletriage in a call centre model. All six programs operate 24/7 and none requires callers to contact them before attending an ED or drop-in clinics. All programs offer teletriage services, symptom management for acute symptoms, referral to other health services such as public health and links to emergency services in their jurisdiction. Five programs also provide health information and referral to MDs' offices or RN-led health centres and four offer other services such as aboriginal health and multilingual consultation.

All six programs use clinical protocols, with most purchased from US companies and customized for jurisdictional needs. The protocols are designed using evidence and expert opinion, updated regularly and integrated into the documentation system of most call centre programs. All programs provide staff orientation.

Five of the six jurisdictions with call centres performed program evaluations to assess effectiveness during either the pilot project or regular program. The evaluation reports demonstrate high caller satisfaction with the call centre programs (range of 86% to 99%) with three programs reporting decreased non-urgent visits to the ED (range of 8% to -32%). Three jurisdictions have undertaken economic analyses for their call centre programs. The cost per triage call ranges from C\$10 to C\$27 and varies by program, based on the number of staff employed and the population served.

## 8 DISCUSSION

Teletriage is the provision of telephone support by health professionals for client-initiated contact about health inquiries. The goals include directing callers to the appropriate level of care required, including self-care and informal care and determining the urgency for care. Three teletriage models are:

- MD teletriage in group practices
- RN-NP teletriage in group practices
- RN teletriage in call centres.

The primary model in the Canadian context is RN teletriage in call centres.

Ten studies evaluated these models using comparison study designs. An additional five Canadian call centres conducted program evaluations. Four studies evaluated MD teletriage,<sup>43,44,50,51</sup> four evaluated RN-NP teletriage in group practices<sup>46,47,49,52</sup> and seven evaluated RN teletriage in call centres (two studies,<sup>10,48</sup> five program evaluations<sup>15,62-69</sup>). The difference between practice-based and call centre teletriage is the degree of integration with the caller's personal health information. Practice-based teletriage has a higher level of integration given the common documentation system and overlap in staff, while call centre-based teletriage has minimal, if any, integration with MD practices. A consequence is that the call centre model does not necessarily share information that may be of value to practitioners and clients.

Given the diverse characteristics of teletriage services and study designs found in the international literature and in the Canadian context, an expanded evaluation framework guides the integrated discussion of our findings. RE-AIM is a comprehensive framework used to assess health service interventions and make comparisons across two or more interventions.<sup>70</sup> According to this framework, the impact of an intervention depends on the combined effects of five key dimensions: Reach, Efficacy, Adoption, Implementation and Maintenance (RE-AIM).

### 8.1 Reach

Reach is a measure of the proportion and characteristics of the individuals who participate in the intervention as measured in the total target population.<sup>70</sup> In practice-based models of teletriage, the size of the target population is smaller than that served by call centres. The median target population for practice-based teletriage in eight studies is 10,700 compared to 3.5 million in six Canadian call centre programs (Tables 1, 11). Group practices often provide the first point of contact for those with health issues unless there is a life-threatening situation. As a result, the proportion of the targeted population using the service is likely to be higher in practice settings compared with call centres.

Another indicator of the reach of the teletriage program is the characteristics of the target population participating in the intervention.<sup>70</sup> A UK practice-based RCT<sup>47</sup> and a Canadian call centre program evaluation<sup>63</sup> that compared the characteristics of the callers to the general target population found that callers were more likely to be female, more highly educated, calling on behalf of a child and having good to excellent health. Info-Santé, Quebec's call centre program<sup>64,67</sup> is effective in reaching parents of young children (up to age five), ethno-cultural

groups, French-speaking individuals and those with lower educational level. Canadian evaluations have emphasized the possible influence of the social marketing effort on the fraction and type of population reached.

## 8.2 Efficacy and Effectiveness

Efficacy studies (conducted under ideal circumstances) or effectiveness studies (measured under normal conditions) are used to determine the benefits and harms of an intervention.<sup>37</sup> In all three models, teletriage is found to be safe, with a decrease in health service use immediately after calls. The safety of teletriage by call centre RNs is further supported by findings in two studies, which report that over 90% of calls undergo appropriate triage.<sup>43,63</sup>

There is no increase in the subsequent use of health services (e.g. MD visits, telephone calls) when teletriage is provided in a group practice. Internationally, the impact on subsequent health services is less clear in RN call centre models of teletriage. In one of six studies that compared RN call centre teletriage to MD teletriage, there is an increase in repeat telephone calls to MDs.<sup>48</sup> The other studies report reductions. A similar pattern of subsequent visits is observed in the evaluation of a Canadian call centre pilot project (BC);<sup>15</sup> even though their problems were resolved, callers visited their personal practitioners. Possible reasons identified for these subsequent visits are seeking reassurance and having a record of the health problem. It is impossible, however, to draw conclusions about caller behaviour from pilot models.

Three studies that conducted economic analyses were identified for our systematic review. There were statistically significant cost savings for RN teletriage services provided outside regular business hours, mainly from a decrease in in-person visits to practitioners and ED visits.<sup>10,53</sup> RN teletriage during office hours alone, however, was not shown to lead to cost savings.<sup>49</sup> Three of six Canadian programs<sup>63,64,68</sup> conducted an economic assessment of their call centres. When reductions in personal time loss, transportation costs, child-care expenses and time off work; improved access; and reductions in clients' uncertainty are factors in the analysis, there may be significant gains from a societal perspective.<sup>63,68</sup>

Despite the limited and occasionally inconsistent evidence, teletriage using all three models seems to be effective and safe, with about half of the calls manageable via the telephone alone. Cost savings are more likely for teletriage provided after hours. As the teletriage systems mature, procedures will be fine-tuned and clients' attitudes are likely to change.

## 8.3 Adoption

Another dimension to evaluation is the number of settings that have implemented the intervention and the barriers to implementation.<sup>70</sup> In Canada, six of 13 jurisdictions have adopted RN teletriage in call centres. One jurisdiction recently implemented a program (SK) and another (NS) plans to start a program within the next two years. Group-practice teletriage is being established as part of the primary care reform in ON.<sup>11</sup> The remaining five Canadian jurisdictions without programs have identified a need. Although teletriage is being increasingly adopted in Canada, barriers to implementation still exist. These include securing funding, recruiting

experienced RNs, integrating information systems, consolidating previous teletriage services and “Canadian-izing” the content of US-developed protocols. Nonetheless, some form of teletriage will become a standard feature in the Canadian health care system.

## 8.4 Implementation

Implementation or program integrity is an organizational measure of the extent to which programs are delivered as planned.<sup>70</sup> Program integrity is enhanced by high exposure, adherence to protocols, quality monitoring and positive participant response.<sup>71</sup> The six RN-NP teletriage programs examined in our review and the six Canadian call centre programs are likely to be delivered as planned compared with MD models, given the characteristics of these programs. All RN-NP programs use clinical protocols and monitor the quality of the service (n=12); and most report that orientation is provided for RNs (n=10) with a commitment to continuing education. The QC<sup>66</sup> program evaluation found that the quality of the nurse-caller interaction depends on the expertise and clinical judgment of the RNs and on the use of validated, up-to-date, computer-based clinical protocols.

Another indicator of program integrity is positive participant response. Caller satisfaction with RN call centre teletriage ranges from 55% when compared to MD teletriage<sup>48</sup> to 90% when no comparisons are made.<sup>10</sup> Canadian programs found high caller satisfaction (>85%) with most willing to use the call centre again.<sup>63,67,68</sup> Satisfaction with RN-NP practice-based teletriage was not measured.

Whether MD teletriage services are delivered as planned is less obvious given the lack of details on the characteristics of these services (e.g. indication of clinical protocols, educational opportunities related to teletriage). Evaluations of the response to MD-based programs are positive with about 70% caller satisfaction<sup>10,44,48,51</sup> and over half willing to call the service again.<sup>44</sup> Given a choice, however, callers may prefer to have a face to face MD visit.

## 8.5 Maintenance

In teletriage, maintenance is measured at the organizational level by the duration of the program and at the individual level by the number of repeat callers. Of the six Canadian call centre programs, MB and QC have been in operation the longest (for over nine years) followed by NB (nearly six years), with the three remaining programs (BC, AB, ON) starting service delivery within the last two years. Greater awareness and usage have led to more sophistication in service delivery from Canadian call centre programs since their implementation. Five programs (BC, AB, MB, ON, NB) were initiated as pilot projects serving a subset of the provincial population and were later expanded province-wide. The duration of programs identified in the systematic review was not provided.

Willingness to use the service again, as a measure of potential repeat callers, is over 80% for Canadian programs<sup>63,67</sup> and over 50% for MD-practice teletriage in the UK.<sup>50</sup> The Canadian survey identifies several challenges to program maintenance. For example, lack of awareness can be addressed through marketing. The challenge is to balance effective marketing against

overburdening the call centre program. A challenge that will arise during the development stage is the shifting patterns of calls, including a rapid increase in demand and the need to match staffing to call patterns. Finally, there is a need to standardize quality monitoring in and across teletriage programs. Standardized evaluation criteria, such as the framework developed by the Centre for Rural and Northern Health Research,<sup>14</sup> can provide necessary feedback on the impact of the teletriage service and will enhance program sustainability. The Canadian initiatives to develop national guidelines may also address this issue.<sup>28</sup>

## 8.6 Limitations of this Review

There were five limitations in our attempt to integrate the findings from the systematic review and those from the Canadian call centre survey.

- There were differences in the models of teletriage found in the systematic review compared with the models found through our survey of Canadian programs. Studies identified in the systematic review were mainly RN or MD teletriage in practice settings serving a smaller population and were conducted in the US or UK. On the other hand, in Canada, all the teletriage services were provided in RN call centre programs serving the population of the jurisdiction.
- There was insufficient evidence about the effectiveness or cost-effectiveness of teletriage programs in Canada.
- The few studies (n=10) that were identified in the systematic review were of low methodological quality.
- Higher methodological quality evidence for the effectiveness for teletriage was found in those studies conducted in group-practice settings.
- This review evaluated the impact of an intervention called “teletriage” that had different program characteristics in each study and settings. There were consistent elements such as the use of clinical protocols across RN teletriage settings, but there was no measure of the quality of these elements or of the consistency of their implementation.

## 8.7 Implications for Policy and Practice

Given that there is insufficient Canadian evidence of the effectiveness or cost-effectiveness of teletriage, the decision to initiate and sustain these programs in Canada is likely to be based on limited evidence from the UK and US, subjective findings from the evaluation of Canadian programs, the needs of provincial and territorial health care systems and the objectives of decision-makers. Several areas for improvement or expansion in teletriage include:

- enhancing the integration of call centre programs with primary care and monitoring the impact on subsequent MD visits and repeat calls (one important step will be to create links to clients’ personal health information through the use of electronic medical records)
- developing national guidelines<sup>28</sup> or accreditation standards<sup>27</sup> with quality indicators to facilitate comparisons across teletriage programs
- boosting the use of services through marketing to groups such as rural residents, older persons, people with lower educational status and those with poorer self-rated health
- expanding programs to include chronic disease management

- improving support for self-care and informal care through access to resources and guidance for callers making preference-sensitive health decisions
- providing health information topics such as on drugs, poison control, pregnancy and HIV-AIDS; or urgent support in situations such as an attempted suicide.

## 8.8 Implications for Research

Eight ongoing studies identified in the clinical systematic review focus on RN versus paramedic teletriage provided via emergency response lines; integration of teletriage with home care services; teletriage in a minor injuries unit; and further evaluation of the research questions discussed in this review (Appendix 4).

The findings from our clinical and economic reviews and the survey of Canadian call centre programs show that there is a need for valid, reliable instruments that can be used to evaluate teletriage. Several additional research questions were identified.

- What is the longer term effect of delivery models of teletriage services, including those that emphasize self-care and informal care, on subsequent health services use?
- What effect does access to electronic medical records have on the quality of teletriage services?
- What features of teletriage enhance the development of callers' skills in problem solving and managing health problems?
- What are the needs of sub-populations (e.g. individuals of lower socioeconomic status or those with chronic diseases) regarding non-urgent health problems and how can teletriage programs adequately address these needs?
- Can teletriage reduce costs in the Canadian health care system?
- What impact does teletriage have on quality of life?
- What outcome indicators are associated with higher quality teletriage services?

## 9 CONCLUSIONS

Despite the growing use of teletriage, little international research has been done using comparative study designs to determine the effectiveness or cost-effectiveness of services. Little research has been done in Canada. Findings from US and UK studies suggest that teletriage, by RNs, NPs or MDs, reduces immediate visits to physicians without causing adverse outcomes such as subsequent hospitalizations, ED visits or deaths. About half of the calls can be managed via the telephone alone. Most callers are satisfied with the service. Two economic studies demonstrate cost savings as a result of RN teletriage services provided outside regular business hours.

In Canada, seven provinces have province-wide call centre teletriage programs, one jurisdiction plans to start a program within two years and the other five have identified a need. These programs vary in size, type, experience, resources and scope. Evaluations done on five of the seven programs are limited, producing minimal evidence of clinical impact (high caller satisfaction, decreased visits to ED) and providing estimates of costs per call (C\$10 to C\$27).

Given the lack of comparative research, it is premature to determine the “best” model. RN teletriage call centre programs in Canada target a large proportion of the population and provide universal access to an immediate response for health issues. Factors that enhance program integrity and that minimize the risk of litigation include clinical protocols to guide the telephone consultation; orientation and continuing education for providers; and ongoing monitoring of program quality.

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## Appendix 1: Search Strategy

### In Dialog®

de = descriptor, ie. Medical Subject Heading (a controlled, thesaurus term)  
 ti = title (i.e. word has to occur in title field of the bibliographic record)  
 ab = abstract (i.e. word has to occur in abstract field of bibliographic record)  
 ! = explode; picks up narrower terms as well, i.e. terms which are conceptually subsets of a broader term  
 () = words must be adjacent  
 (3w) = words a maximum of three words apart in either direction  
 ? = truncation symbol

### In Ovid Technologies Inc.

sh = subject heading  
 tw = textword

### In PubMed

MeSH terms = Medical Subject Headings  
 In Cochrane Collaboration and Update Software  
 me = Medical Subject Headings, or MeSH

### In CINAHL Information Systems

mjx, mnx = major and minor Medical/CINAHL Subject Headings

Database	Limits	Keywords
Dialog® OneSearch®  MEDLINE® (File 155) (To Feb. Week 2, 2003); CANCERLIT® (File 159) (To Feb. 2003)	1980+	<ol style="list-style-type: none"> <li>1. hotlines/de OR telecommunications!</li> <li>2. [hotline? OR helpline? OR healthline? OR telehealth OR tele()health OR teletriag? OR tele()triag?/ti,ab OR telecare/ti,ab OR tele()care OR teleconsultation? OR tele()consultation? OR telemedicine OR tele()medicine OR call?(w3)centre? OR call?(3w)center? OR telephone?(w3)center? OR telephone(w3)centre? OR tele()medic? OR tele-accueil? OR tele()accueil? OR telepharmac? OR tele()pharmac? OR telehome? OR tele()home? OR telehomecare OR tele()homecare OR telenurs? OR tele()nurs?]/ti,ab</li> <li>3. Set 1 OR Set 2</li> <li>4. telephone/de OR telephone/ti,ab</li> <li>5. Set 3 AND Set 4</li> <li>6. nurses! OR nursing staff! OR nursing assessment! OR nursing care! OR nursing! OR nursing services! OR nursing, team/de OR nurs?/ti,ab OR telenurs?/ti,ab OR telephone(3w)nurs?/ti,ab OR medical staff! OR medical staff, hospital! OR physicians! OR pharmacists/de OR pharmaceutical services!</li> <li>7. [nurs? OR pharmacist? OR pharmacy()staff OR</li> </ol>

Database	Limits	Keywords
		<p>physician? OR doctor? OR pediatrician OR family()practitioner? OR general()practitioner? OR cardiologist? OR physiatrist? OR geriatrician? OR surgeon? OR anaesthetist? OR anesthetist? OR gastroenterologist? OR neurologist?]/ti,ab</p> <p>8. Set 6 OR Set 7</p> <p>9. dt=(clinical trial OR clinical trial, phase I OR clinical trial, phase ii OR clinical trial, phase iii OR clinical trial, phase iv OR meta-analysis OR controlled clinical trial OR randomized controlled trial OR multicenter study OR review OR review literature)</p> <p>10. clinical trials! OR review literature! OR cohort studies! OR case-control studies! OR (data collection OR random allocation OR meta-analysis OR evaluation studies OR organizational case studies OR case studies OR pilot projects OR program evaluation)/de</p> <p>11. [(random? OR controlled()trial? OR controlled()clinical() trial? OR clinical()trial? OR historical()control? OR pre()measurement OR post()measurement) OR multicenter()trial? OR multicentre()trial? OR meta analy? OR metaanaly? OR meta-analysis OR meta-analyses OR research() integration OR research() overview? OR quantitative()review? OR quantitative() overview? OR methodologic() review? OR methodologic() overview? OR systematic()overview? OR systematic()review? OR integrative()research OR quantitative()synthesis OR quantitative()syntheses OR comparative()stud? OR prospective()stud? OR retrospective()stud? OR rct? OR organizational()stud? OR review? OR cohort? OR case()control?]/ti,ab</p> <p>12. Set 9: Set 11</p> <p>13. Set 5 AND Set 8 AND Set 12</p> <p>14. S13/1980:2002</p> <p>15. S14 from 155 (clinical refs MEDLINE®)</p> <p>16. S14 from 159 (clinical refs CANCERLIT®)</p> <p>17. economics!</p> <p>18. value of life/de</p> <p>19. [economic? OR cost? OR price? OR pricing OR expenditure? OR budget? OR qaly OR quality()adjusted()life() year? OR discount? OR willingness()pay OR afford?]/ti,ab</p> <p>20. Set 17: Set 19</p> <p>21. Set 3 AND Set 5 AND Set 8 AND Set 20</p> <p>22. S21/1980:2002</p> <p>23. S22 from 155 (economic refs MEDLINE®)</p> <p>24. S22 from 159 (economic refs CANCERLIT®)</p>

<b>Database</b>	<b>Limits</b>	<b>Keywords</b>
PsycINFO® (File 11) (To Feb. Week 2, 2003)	1980+	25. (hot line services OR telephone systems)de 26. (Set 25 OR Set 2) AND telephone/ti,ab 27. (nurses OR nursing OR physicians OR family physicians OR general practitioners OR pediatricians OR clinicians OR medical personnel OR pharmacist)/de OR Set 7 28. (quality of care OR quality of services OR treatment effectiveness evaluation OR treatment outcomes OR program evaluation OR methodology OR cohort analysis OR data collection OR empirical methods OR meta analysis OR experimental design) 29. Set 28 OR Set 11 30. Set 26 AND Set 27 AND Set 29 31. Set 30 from 11 = (clinical refs PsycINFO) 32. economics/de OR budgets/de OR cost containment/de OR health care costs/de OR money/de OR funding/de OR “costs and cost analysis”/de OR Set 19 33. Set 26 AND Set 27 AND Set 32 from 11 = (economic refs from PsycINFO®)
EMBASE (File 73) (To Feb. Week 2, 2003)		34. telephone/de OR Set 2 35. Set 34 AND Set 4 36. (nursing staff OR general practitioner OR hospital physician OR medical expert OR medical specialist OR medical staff OR occupational physician OR pediatrician OR physician OR health practitioner OR nurse OR nurse practitioner OR pharmacist)/de OR S7 37. controlled study! OR (comparative study OR randomized controlled trial OR prospective study OR retrospective study OR meta analysis OR clinical trial OR multicenter study OR phase 1 clinical trial OR phase 2 clinical trial OR phase 3 clinical trial OR phase 4 clinical trial OR pilot OR case control study OR cohort analysis OR evaluation OR follow up OR longitudinal study)/de OR conference paper! 38. Set 37 OR Set 11 39. Set 35 AND Set 36 AND Set 38 40. S39/1980:2002

Database	Limits	Keywords
		41. Set 40 from 73 =(clinical refs from EMBASE)  42. (economic aspect OR economic evaluation OR quality adjusted life year OR cost effectiveness analysis OR cost benefit analysis OR cost utility analysis)/de OR Set 19  43. Set 35 AND Set 36 AND Set 42 44. S43.1980:2002 45. S44 from 73 = (economic refs from EMBASE)
		46. Set 15 OR Set 16 OR Set 31 OR Set 41 47. RD ( Reduce duplicate references) Set 46 = clinical 48. Set 23 OR Set 24 OR Set 33 OR Set 45 49. RD (Reduce duplicate references) = economic references
Ovid Technologies Inc.  CINAHL (1982-July wk 4 2002)	1982-2002 (CINAHL begins 1982)	1. telephone information services.sh. OR exp telecommunications OR telephone-consultation-iowa-nic.sh. 2. [hotline OR hotlines OR helpline OR helplines OR healthline OR healthlines OR teletriage OR teletriages OR teletriaging OR (tele adj triage) OR (tele adj triages) OR telecare OR telecaring OR teleconsultation OR teleconsultations OR teleconsulting OR teleconsultant OR teleconsultants OR (tele adj consult?) OR telemedicine OR (tele adj medicine) OR (call? adj center?) OR (call? adj centre?) OR (telephone? adj3 centre?) OR (call? adj3 centre?) OR (tele adj care?) OR (tele adj home) OR (tele adj health) OR (tele adj accueil?) OR teleaccueil OR (tele adj medic?) OR telemedic OR (telepharmac? OR (tele adj pharmacy?) OR telehomecare OR (tele adj home adj care) OR telenurs? OR (tele adj nurs?)].tw. 3. Set 1 OR Set 2 4. telephone.sh OR (telephone? OR telephon? OR phone? OR phoning).tw. 5. Set 3 AND Set 4  6. exp nurses OR nursing assessment.sh. OR exp nursing staff, hospital OR exp nursing care OR nursing service.sh. OR exp physicians OR medical staff.sh. OR medical staff, hospital.sh. OR pharmacists.hw. OR (pharmacist? OR nurs? OR telenurs? OR doctor? OR physician? OR geriatrician? OR anesthesiologist? OR anesthetist? OR neurologist? OR anesthesiologist? OR (family adj practitioner?) OR cardiologist? OR gastroenterologist? OR physiatrist?).tw. 7. exp prospective studies OR exp case control OR exp clinical trials studies OR exp data collection OR meta analysis/sh. OR exp evaluation research OR pilot studies.sh. OR exp program evaluation/ OR exp experimental studies OR exp program evaluation OR

Database	Limits	Keywords
		<p>clinical trial.pt. OR review.pt.</p> <p>8. [random? OR rct? OR cohort? OR review? OR (controlled adj trial?) OR (controlled adj clinical adj trial? OR (clinical adj trial?) OR (historical adj control?) OR (pre adj measurement) OR (post adj measurement) OR (multicenter adj trial?) OR (multicentre adj trial?) OR (meta adj analy?) OR metaanaly? OR meta-analy? OR (research adj integration) OR (research adj overview?) OR (quantitative adj review?) OR (quantitative adj overview?) OR (methodologic adj review? OR (methodologic adj overview) OR (systematic adj overview) OR (systematic adj review?) OR (integrative adj research) OR (quantitative adj synthesis) OR (quantitative adj syntheses) OR prospective adj stud?) OR (retrospective adj stud?) OR case adj control?) OR (organizational adj stud?)].tw.</p> <p>9. Set 5 AND Set 6 AND (Set 7 OR Set 8)= clinical references</p> <p>10. exp economics OR [economic? OR cost? OR price? OR pricing OR OR expenditure? OR money OR budget OR funding OR discount OR discounting).tw. OR afford? OR (value adj life) OR (quality adj adjusted adj life adj year/) OR qaly OR (willingness adj pay)].tw.</p> <p>11. Set 5 AND Set 6 AND Set 10 = economic referemces</p>
PubMed	1980-Sept.30, 2002	<p>1. hotlines[MeSH term] OR telecommunications[MeSH term]</p> <p>2. [hotline? OR helpline? OR healthline? OR telehealth OR telecare OR teleconsultation? OR telemedicine OR tele-accueil?]/ti,ab</p> <p>3. Set 1 AND Set 2</p> <p>4. (nurses OR nursing staff OR nursing assessment OR nursing care OR nursing OR nursing, team OR medical staff, hospital OR physicians OR pharmacists OR pharmaceutical services)[MeSH term]</p> <p>5. (nurs? OR pharmacist? OR physician? OR doctor? OR pediatrician? OR cardiologis?)[Title/Abstract]</p> <p>6. (physiatrist? OR geriatrician? OR anaesthetist? OR gastroengerologist? OR neurologist? OR “family practitioner” OR “pharmacy staff”)[Title/Abstract]OR</p> <p>7. Set 4 OR Set 5 OR Set 6</p> <p>8. Set 3 AND Set 7</p> <p>9. Set 8 AND Limit from publication date 1980/01/01 to 2002/09/30 AND publication type Meta-analysis</p> <p>10. Set 8 AND Limit from publication date 1980/01/01 to 2002/09/30 AND publication type Randomized Controlled Trial</p>

Database	Limits	Keywords
		<p>11. Set 8 AND Limit from publication date 1980/01/01 to 2002/09/30 AND publication type Review</p> <p>12. Set 9 OR Set 10 OR Set 11</p> <p>13. (clinical trials OR review literature OR cohort studies OR case-control studies OR data collection OR random allocation OR meta-analysis OR evaluation studies OR organizational case studies OR pilot projects OR program evaluation)[MeSH terms]</p> <p>14. (random? OR rct? OR cohort? OR review? OR “case control?” OR “controlled clinical trial”</p> <p>15. (Set 13 OR Set 14) AND Set 8 Limited to Publication date from 1980/01/01 to 2002/09/30</p> <p>16. economics [Mesh term] OR economic OR economics OR price? OR pricing? OR expenditure? OR budget? OR funds? OR money OR “willingness to pay” OR qaly OR “quality adjusted life year?”[Title/Abstract]</p> <p>17. Set 8 AND Set 16 limit Publication Date from 1980/01/01 to 2002/09/30</p> <p>18. Set 12 OR Set 15 OR Set 17 = 790 refs</p> <p>Set 18 imported to Reference Manager<sup>®</sup> Teletriage database, and duplicates eliminated.</p> <p>+ additional references from update search</p>
<p>Cochrane Collaboration and Update Software</p> <p>Cochrane Library on CD-ROM</p>	<p>1980-2002</p>	<p>1. (hotlines OR telecommunications):me</p> <p>2. (hotline? OR helpline? OR healthline? OR telehealth OR telecare OR teleconsultation OR telemedicine OR telepharmac? OR telehome OR telehomecare OR telenurs? OR “tele health” OR teletriag? OR teletriaging OR teletriag es OR “tele triage” OR “tele consultation” OR “call centre?” OR “call center?” OR “telephone center?” OR “telephone centre?” OR telemedic? OR “tele nurs?”</p> <p>3. #1 OR #2</p> <p>4. telephone:me</p> <p>5. telephone OR telephones OR telephoning</p> <p>6. #4 OR #5</p> <p>7. #3 AND #6</p> <p>8. (nurses OR nursing staff OR nursing OR nursing services OR nursing team OR medical staff OR medical staff, hospital OR pharmacists OR pharmaceutical services):me</p> <p>9. (nurs OR telenurs OR pharmacist OR physician OR</p>

Database	Limits	Keywords
		<p>doctor OR pediatrician OR cardiologist OR physiatrist OR geriatrician OR surgeon OR anaesthetist OR anesthetist OR gastroenterologist OR neurologist)</p> <p>10. #8 OR #9</p> <p>11. (clinical trials OR review literature OR cohort studies OR case control studies OR data collection OR random allocation OR meta-analysis OR organizational case studies OR pilot projects OR program evaluation):me</p> <p>12. (random OR rct OR metaanaly OR review OR cohort OR “integrative research” OR “research integration” OR “quantitative synthesis” OR “quantitative syntheses” OR “comparative stud?” OR “prospective stud?” OR “retrospective stud?” OR “case control”</p> <p>13. #11 OR #12</p> <p>14. #7 AND #10 AND #13</p> <p>15. economics:me</p> <p>16. (economic OR cost? OR price? OR pricing? OR expenditure? OR budget? OR costing OR discount? OR afford? OR qaly? OR “quality adjusted life year?” OR “willingness to pay”</p> <p>17. #10 AND #16</p> <p>18. #14 OR #17 AND 1980 to 2002</p>
<p>CINAHL Information Systems</p> <p>CINAHL<i>direct</i><sup>®</sup></p>	<p>Update Search</p>	<p>1. (telephone-information-services OR telecommunications OR exp telehealth OR telephone-consultation-iowa-nic).mjj,mnx.</p> <p>2. (hotline OR hotlines OR helpline OR helplines OR healthline OR healthlines OR telehealth OR teletriage OR teletriaging OR teletriages OR telecare OR telecaring OR teleconsultation OR teleconsultations OR teleconsulting OR teleconsultant OR telemedicine).tw.</p> <p>3. [(call adj center) OR (call adj centre? OR (telephone adj center?) OR (telephone adj centre?)].tw.</p> <p>4. (telemedic? OR tele-accueil? OR telepharmac? OR telehome? OR telehomecare? OR telenurs?).tw.</p> <p>5. S1: S4</p> <p>6. telephone.mjj, mnx. OR telephone?.tw.</p> <p>7. (exp nurses OR nursing-staff-hospital OR nursing-assessment OR exp nursing-care OR nursing-service OR expmedical-staff OR exp physicians OR pharmacists or exp physicians).mjj,mnx.</p> <p>8. [nurs? OR (telephone adj nurs?) OR telenurs? OR doctor?].tw.</p> <p>9. S7:S8</p> <p>10. (exp prospective-studies OR exp clinical-trials OR exp case-control-studies OR exp data-collection OR meta-analysis OR exp evaluation-research OR pilot-studies OR program-evaluation OR exp experimental-studies).mjj,mnx.</p> <p>11. [random? OR rct? OR review? OR cohort? OR</p>

Database	Limits	Keywords
		<p>(controlled adj trial?) OR (historical adj control?) OR (clinical adj trial?) OR (pre adj measurement) OR (multicenter adj trial?) OR (multicentre adj trial?) OR meta adj analy?) OR metaanaly? OR meta-analysis OR (research adj integration) OR (research adj overview?0 OR (quantitative adj review?) OR (methodologic adj review?) OR (systematic adj overview?) OR (systematic adj review?) OR (integrative adj research) OR (quantitative adj synthesis) OR (comparative adj stud?) OR (retrospective adj stud?) OR (case adj control?).tw.</p> <p>12. S10:S11  13. S5 AND S6 AND S9 AND S12  14. S13 AND 1980 to 2002  15. S13 AND Publication type=Research AND 1980 to 2002  16. S13 AND Publication type=controlled trial AND 1980 to 2002  17. S14:S17</p>
CCOTHA HTA Checklist		Web Sites of health technology assessment and other agencies; specialized databases such as the NHS Centre for Reviews and Dissemination databases; clinical trial registers; etc.
Internet searching using Google™		Appropriate terms, such as teletriag* OR telenurs*

# Appendix 2: Study Screening for Eligibility Form

## Telephone Triage Systematic Review

In

All studies that are subjected to a screening process should:

Out

- be applicable to patient or consumer initiating contact for triage of health issues
- be empirical
- have a telephone consultation intervention by a nurse, MD or pharmacist

Unsure

Source:  Electronic databases  Hand search  Personal contact  Other \_\_\_\_\_

Date of review: \_\_\_\_\_

Study ID \_\_\_\_\_ First author \_\_\_\_\_ Year \_\_\_\_\_ Country \_\_\_\_\_

	<b>Include if:</b>	<b>Exclude if:</b>
<b>Intervention</b> Intervention provided:	<input type="checkbox"/> by nurse or <input type="checkbox"/> MD or <input type="checkbox"/> pharmacist and <input type="checkbox"/> via telephone <input type="checkbox"/> with or without other resources (e.g. Internet, handbook)	<input type="checkbox"/> by non-MD, non-RN, non-pharmacist (e.g. physiotherapist, volunteer) <input type="checkbox"/> via other communications methods (e.g. Internet, video, television) <input type="checkbox"/> as a follow-up call post discharge <input type="checkbox"/> as chronic disease management <input type="checkbox"/> as a clinical trial entry <input type="checkbox"/> as other, specify _____
<b>Outcome Measures</b> The intervention is targeted for:	<input type="checkbox"/> triage decisions such as <ul style="list-style-type: none"> <li>• seeking medical attention</li> <li>or</li> <li>• getting advice or</li> <li>• self-care or</li> <li>• wait and see</li> </ul>	<input type="checkbox"/> general information <input type="checkbox"/> general assessment <input type="checkbox"/> making lifestyle changes (quit smoking, lose weight, exercise) <input type="checkbox"/> other, specify _____
<b>Population</b> Participants are:	<input type="checkbox"/> making a triage decision about a health issue for themselves or another person  <input type="checkbox"/> >14 years	<input type="checkbox"/> making a hypothetical decision  <input type="checkbox"/> #14 years
<b>Study Design</b> Study design is:	<input type="checkbox"/> RCT <input type="checkbox"/> before-after <input type="checkbox"/> case control	<input type="checkbox"/> cohort <input type="checkbox"/> case series <input type="checkbox"/> descriptive <input type="checkbox"/> survey
<b>Language</b> Article is written in:	<input type="checkbox"/> English <input type="checkbox"/> French <input type="checkbox"/> other, specify _____	
<b>Publication Status</b> Article is:	<input type="checkbox"/> published <input type="checkbox"/> unpublished (grey literature)	

## Appendix 3: Studies Excluded from Systematic Review

Reference	Rationale
<b>Intervention</b>	
1. Barry HC, Hickner J, Ebell MH, Ettenhofer T. A randomized controlled trial of telephone management of suspected urinary tract infections in women. <i>J Fam Pract</i> 2002;50(7):589-94.	Telephone answered by receptionist and managed via protocol
2. Burt K. Nurses use telehealth to address rural health care needs, prevent hospitalizations. <i>Am Nurse</i> 1997;29(6):21.	Chronic disease management, other telecommunications
3. Foat PS. Setting up a direct line referral system: eye triage by telephone. <i>Ophthalmic Nurs</i> 1999;3(3):8-12.	Specific condition management, eye injury
4. Gammaitoni AR, Gallagher RM, Welz M, Gracely EJ, Knowlton CH, Voltis-Thomas O. Palliative pharmaceutical care: a randomized, prospective study of telephone-based prescription and medication counseling services for treating chronic pain. <i>Pain Med</i> 2000;1(4):317-31.	Chronic disease management
5. de Groot RA, de Haan J, Bosveld HE, Nijland A, Meyboom-de Jong B. The implementation of a call-back system reduces the doctor's workload, and improves accessibility by telephone in general practice. <i>Fam Prac</i> 2002; 19(5):516-19.	Non-professional triage calls
6. Hampers LC, Faries SG, Poole SR. Regional after-hours urgent care provided by a tertiary children's hospital. <i>Pediatrics</i> 2002;110(6):1117-24.	No telephone intervention
7. Hampers LC, Faries SG, Poole SR. Regional after-hours urgent care provided by a tertiary children's hospital. <i>Pediatrics</i> 2002;110(6):1117-24.	No telephone access included
8. Holt N, Crawford MA. Medical information service via telephone: the pioneer of physician consultation services. <i>Ann N Y Acad Sci</i> 1992; 670: 155-62.	MD to MD consultation
9. Infante-Rivard C, Krieger M, Petitclerc M, Baumgarten M. A telephone support service to reduce medical care use among the elderly. <i>J Am Geriatr Soc</i> 1988;36(4):306-11.	Follow-up post-discharge, nurse initiated calls
10. Johnson-Mekota JL, Maas M, Buresh KA, Gardner SE, Frantz RA, Specht JKP, et al. A nursing application of telecommunications: measurement of satisfaction for patients and providers. <i>J Gerontol Nurs</i> 2001;27(1): 28-33.	Disease management
11. Riegel B, Carlson B, Kopp Z, LePetri B, Glaser D, Unger A. Effect of a standardized nurse case-management telephone intervention on resource use in patients with chronic heart failure. <i>Arch Intern Med</i> 2002;162(6):705-12.	Disease management, nurse initiated calls
12. Roth A, Malov N, Carthy Z, Golovner M, Naveh R, Alroy I, et al. Potential reduction of costs and hospital emergency department visits resulting from prehospital transtelephonic triage – the Shahal experience in Israel. <i>Clin Cardiol</i> 2000;23(4):271-6.	Other telecommunications methods
13. Schuldheis S. Economic evaluation of a telephone delivery self-help nursing intervention [abstract]. <i>Commun Nurs Res</i> 2001;34(9):223.	Chronic disease management, nurse initiated calls
14. Vickery DM, Kalmer H, Lowry D, Constantine M, Wright E, Loren W. Effect of a self-care education program on medical visits. <i>JAMA</i> 1983;250 (21):2952-6.	Telephone one of several interventions and not used much (20 calls)
15. Wallace P, Haines A, Harrison R, Barber J, Thompson S, Jacklin P, et al. Joint teleconsultations (virtual outreach) versus standard outpatient appointments for patients referred by their general practitioner for a specialist opinion: a randomised trial. <i>Lancet</i> 2002;359(9322):1961-8.	Referral to specialists, not patient initiated

Reference	Rationale
<b>Outcome measures</b>	
16. Barber JW, King WD, Monroe KW, Nichols MH. Evaluation of emergency department referrals by telephone triage. <i>Pediatrics</i> 2000;105(4 PT 1):819-21.	Not outcome of interest, appropriateness of visits only measure
17. Marklund B, Silfverhielm B, Bengtsson C. Evaluation of an educational programme for telephone advisers in primary health care. <i>Fam Pract</i> 1989;6(4):263-7.	Not outcome of interest, nurse performance
18. Rush JP, Kitch TL. A randomized, controlled trial to measure the frequency of use of a hospital telephone line for new parents. <i>Birth</i> 1991;18(4):193-7.	Not outcome of interest, proportion using telephone line, both groups used same intervention
19. Salk ED, Schriger DL, Hubbell KA, Schwartz BL. Effect of visual cues, vital signs, and protocols on triage: a prospective randomized crossover trial. <i>Ann Emerg Med</i> 1998;32(6):655-64.	Not outcome of interest, agreement
20. Wagner TH, Hu TW, Hibbard JH. The demand for consumer health information. <i>J Health Econ</i> 2001;20(6):1059-75.	Not outcome of interest, use of telephone, nurses, books, computer information
<b>Study design</b>	
21. Phone triage program cuts comp costs: nurses help workers decide when to see care. <i>Case Manage Advis</i> 2000;11(3):44-6.	Program description, no comparison group
22. Triage program provides direct access to ER care, but without the high cost. <i>Healthc Demand Dis Manag</i> 1999;5(6):91-3.	Not a study, about a program
23. Baxter MA, Blankenship PS, Kornacki E, McMahan C, Epstein B. Managing care through high-quality, customer-focused service: HealthCall. <i>Healthc Inf Manage</i> 1998;12(2):41-52.	Survey of program, no comparison group
24. Brown JM, Kelling DK, Alexander MM, Burmeister LF. Comparative evaluation of clinical pharmacists and physicians in the management of medication-related telephone calls in family practice offices. <i>Am J Hosp</i> 1982;39(3):437-43.	Survey of program, outcome was appropriateness
25. Christopherson KA. Call centres in healthcare: the experience of one health maintenance organization. <i>Healthc Inf Manage</i> 1998;12(2):53-7.	Not a study
26. Edmonds E. Telephone triage: 5 years' experience. <i>Accid Emerg Nurs</i> 1997;5(1):8-13.	Survey of program, no comparison group
27. Gruenewald MM, Artz KK. The consulting nurse service- A model of health care delivery by telephone. <i>Nursing Admin Quarterly</i> 1980; 4(4):17-9.	Not a study
28. Hagan L, Garon G. Info-Santé CLSC: Un service efficace? <i>Can J Public Health</i> 1998;89(2):125-8.	Survey of program participants, no comparison
29. Hagan L, Morin D, Lepine R. Evaluation of telenursing outcomes: satisfaction, self-care practices, and cost savings. <i>Public Health Nurs</i> 2002; 17(4):305-13.	Survey of program participants, no comparison
30. Hamill CT, Harris-Stevens L. 24-hour call centers and home healthcare. <i>Home Care Provid</i> 1998;3(6):324-5.	Not a study, about a program
31. Horton MC. Identifying nursing roles, responsibilities, and practices in telehealth/telemedicine. <i>Healthc Inf Manage</i> 1997;11(2):5-13.	Role study

Reference	Rationale
32. Johnston RM, Nevins RL, Weaver ML. Another kind of tele-home health: medical call centers. <i>Telemed Today</i> 1997;5(4):20, 23.	Not a study
33. Kennelly C. Direct enquiries. <i>Health Serv J</i> 1998;108(5615):24-5.	Survey, no comparison group
34. Lafrance M, Leduc N. La connaissance du service telephonique Info-Sante CLSC chez les usagers des services d'urgence. <i>Can J Public Health</i> 2002; 93(1): 67-71.	Survey, no comparison group
35. Larson-Dahn MI. Tel-eNurse Practice. Quality of care and patient outcomes. <i>J Nurs Admin</i> 2001;31(3):145-52.	Not a study, model of a service
36. Marklund B, Bengtsson C, Blomkvist S, Furunes B, Gacke-Herbst R, Silfverhielm B, et al. Evaluation of the telephone advisory activity at Swedish primary health care centres. <i>Fam Pract</i> 1990;7(3):184-9.	Survey of program participants, no comparison
37. Mayo AM. The experience of decision-making among telephone advice/triage nurses. <i>Diss Abstr Int Sect B Sci Eng</i> 1998;59(4-B):1586.	Phenomenological qualitative study
38. Morrissey J. On call. Foundation Health Systems' sophisticated telephone triage center gains popularity with patients and physicians. <i>Mod Healthc</i> 1997;27(34):72-80.	Survey of program, no comparison group
39. Munro J, Nicholl J, O'Cathain A, Knowles E. Impact of NHS direct on demand for immediate care: observational study. <i>BMJ</i> 2000;321(7254): 150-3. Available: <a href="http://bmj.bmjournals.com/cgi/content/full/321/7254/150">http://bmj.bmjournals.com/cgi/content/full/321/7254/150</a>	Program evaluation
40. Perkins A, Gagnon R, deGruy F. A comparison of after-hours telephone calls concerning ambulatory and nursing home patients. <i>J Fam Pract</i> 1993; 37(3):247-50.	Descriptive audit of program, no comparison group
41. Nurse telephone triage in out-of-hours primary care: a pilot project. South Wiltshire Out of Hours Project (SWOOP) Group. <i>BMJ</i> 1997;314(7075):198-9. Available: <a href="http://bmj.bmjournals.com/cgi/content/full/314/7075/198">http://bmj.bmjournals.com/cgi/content/full/314/7075/198</a>	Survey design, no comparison group
42. Simonsen-Anderson S. Safe and sound: telephone triage and home care recommendations save lives—and money. <i>Nurs Manage</i> 2002;33(6):41-3.	Not a study
43. Tanner CA, Izumi S, Ewing D, Valanis B, Keyes C, Moscato S. Practice variations in telephone advice nursing [abstract]. <i>Commun Nurs Res</i> 2002; 33:212	Descriptive study, no comparison group
44. Valanis B, Tanner C, Moscato S, David M, Shapiro S, Izumi S. Telephone advice nursing: facilitating access to health care [abstract]. <i>Commun Nurs Res</i> 2002;35(10):339.	Descriptive design, no comparison group
45. Wheeler SQ. ED telephone triage: lessons learned from unusual calls. <i>J Emerg Nurs</i> 1989;15(6):481-7.	Not a study
46. Williams S, Crouch R, Dale J. Providing health-care advice by telephone. <i>Prof Nurse</i> 1995;10(12): 750-2.	Survey of program, no comparison group

## Appendix 4: Characteristics of Studies in Progress or Pending Publication

Name of Study	Participants	Intervention	Outcomes	Start and End Dates	Contact Information
Clinical, organizational and cost consequences of computer-assisted telephone advice to category C999 ambulance service callers: results of a controlled trial	Calls to 999 ambulance service priorities by call-takers as presenting with non-urgent problems	Nurse assessment and triage versus paramedic assessment and triage versus control	Triage assessment, subsequent cancellation of ambulance, caller satisfaction, health outcome, SF12, nurse or paramedic decision making, economic analysis	Proposed to start 01/04/1997  Proposed to end 01/04/2000	Jeremy Dale Centre for Primary Health Care Studies, University of Warwick Coventry CV4 7AL
Cost-effectiveness of telephone advice in managing non-life threatening calls to ambulance services		Nurses versus ambulance paramedics providing teletriage	Economic analysis	02/06/1998 to 01/12/2002	J. Dale King's College Weston Education Bessemer Rd. London, SE5 9PJ www.uclh.org
Minor injuries unit telephone advice system	Calls to after-hours MD service	Triage of calls by trained nurses	After-hours workload for MDs reduced by nearly 60%	Start in September 1997	Mary Critcher Andover War Memorial Community Hospital
Evaluation of acceptability of telephone consultations as an alternative to face to face consultations	Callers requesting appointment to see MD	MD telephone consultation versus in person consultation	Acceptability, satisfaction		Dr. Keith Hopcroft Laindon Health Centre High Road Laindon, Nr Basildon Essex, SS15 5TR keithhopcroft@supanet.com
Exploratory study to evaluate patient outcomes as a result of clinical decision making made by telephone triage	Callers to MD cooperative	Teletriage	Understandability of advice, relief of symptoms, needs addressed using advice	01/10/2001 to 30/09/2002	Pauline Alexander Triage Nursing Chester & Halton Community NHS Trust St Martin's Clinic St Martins Way Chester, CH1 2NR

<b>Name of Study</b>	<b>Participants</b>	<b>Intervention</b>	<b>Outcomes</b>	<b>Start and End Dates</b>	<b>Contact Information</b>
practitioners in out-of-hours MD cooperative					alexande@liverpool.ac.uk
Integration of teletriage and home care services into sustainable service for Toronto children	Parents with health questions or issues about their child	Includes teletriage 24 hours, 7 days a week			Paul Dick, Paediatric Medicine, The Hospital for Sick Children; and Nancy Young, Community Health Systems Resource Group, Toronto, Ontario <a href="http://www.sickkids.on.ca/communityhealth/researchteletriage.asp">http://www.sickkids.on.ca/communityhealth/researchteletriage.asp</a>
Primary care reform pilot projects in ON	Enrollees in primary care reform group practices	Includes access to nurse triage evenings, nights and weekends.	Volume of calls, types of callers, decision made, service utilization, patient acceptance	1999	PriceWaterhouseCoopers <a href="http://www.oma.org/phealth/pcrphas11.htm">www.oma.org/phealth/pcrphas11.htm</a>
Assessing effects of teletriage on health services utilization for rostered population in northern ON	Enrollees of group health centre	Teletriage by nurses	Patient opinions on teletriage and perception of health status, impact of services and programs of group health centre, costs and policy implications		Raymond Pong <a href="http://laurentian.ca/cranhr/rural5.html">http://laurentian.ca/cranhr/rural5.html</a>

## Appendix 5: Telephone Triage Data Extraction Form for Eligible Studies

Study ID \_\_\_\_\_ First author \_\_\_\_\_ Year \_\_\_\_\_  
 Country \_\_\_\_\_ Journal \_\_\_\_\_  
 Language:     English         French         Other \_\_\_\_\_  
 Publication status:     Published         Unpublished  
 Target population:     General public     MD office         Specific population \_\_\_\_\_  
 Time frame of study: \_\_\_\_\_

### A. Situation

Study objective(s): \_\_\_\_\_  
 \_\_\_\_\_

Type of issue     Triage for acute care (medical attention, self care, wait and see); patient initiated; or  
                           Other \_\_\_\_\_

### B. Interventions

Code Name	Label Given By Study Authors
MI: main intervention group (involving telephone)	
CG#1: comparison group #1	
CG #2: comparison group #2	

### C. Description of Setting

\_\_\_\_\_  
 \_\_\_\_\_

### D. Study Design

Research design:     RCT             Case control             Before-after  
                           Other \_\_\_\_\_

Blinding            Patient blinded to comparison intervention         yes  no     not ascertainable  
                          Person administering outcome measures blinded     yes  no     not ascertainable  
                          Person administering consultation blinded             yes  no     not ascertainable  
                          Research personnel analyzing data blinded             yes  no     not ascertainable

#### Sampling technique

Selection of subjects to participate in study  
 simple random     stratified random         consecutive         convenience  
 quota                 purposive                 other



**I. Overall Strengths and Limitations**

**MI – Main Intervention**

1. Description of intervention \_\_\_\_\_

2. Schedule     days per week, 24 hours per day  
                   outside office hours (evenings, nights, weekends)  
                   other  
                   not ascertainable

3. Who provides information, advice, counselling?  
 registered nurse                     personal medical practitioner                     other medical practitioner  
 nurse practitioner                     not ascertainable                     other \_\_\_\_\_

4. Were protocols used for providing telephone advice?  
 Yes     No     not ascertainable  
If yes, specify source \_\_\_\_\_

5. Was training provided?  
 Yes     No     not ascertainable  
If yes, specify source \_\_\_\_\_

6. Are there follow-up calls done as part of study?  
 yes →     routine     sometimes     not ascertainable  
 no

7. Does the intervention included other resources:  
 no                     not ascertainable  
 yes, specify \_\_\_\_\_  
 group discussion  written materials     health guide booklet  other \_\_\_\_\_

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**CG#1: Control or Comparison Group Intervention**

**Main difference between comparison group intervention and main intervention**

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Variable	Measure	Time Period of data collection	MI	CG#1	CG#2
			N    mean (SD)	N    mean (SD)	N    mean (SD)
Deaths		Baseline ____ after intervention ____ after intervention			
Visit to emergency department within X days		Baseline ____ after intervention ____ after intervention			
Hospital admission within X days		Baseline ____ after intervention ____ after intervention			
MD contact		Baseline ____ after intervention ____ after intervention			
Health-related quality of life		Baseline ____ after intervention ____ after intervention			
Patient satisfaction		Baseline ____ after intervention ____ after intervention			
Access to other resources		Baseline ____ after intervention ____ after intervention			
Other		Baseline ____ after intervention ____ after intervention			

## Methodological Quality Assessment for RCTs

### 1. Allocation Concealment

Adequate concealment of allocation process:

- use of opaque envelopes
- central office assignment

Inadequate process:  alternation

- reference to case record number or date of birth

Unclear process:  not reported

- fits neither category

### 2. Jadad Scale (1996)

For each criterion, circle the numbers (0, +1, -1) that apply and add the row total. Add the row totals and insert total score.

Criterion	No	Yes	Yes Bonus	Yes Penalty	Row Total
<p><b>Randomization</b> Study described as randomized (+1) (allocation into groups described using words such as randomly, random or randomization)</p> <p>Appropriate (+1) if described use of table of random numbers, computer generated</p> <p>Penalty (-1) if described trial as randomized and used inappropriate method of randomization such as date of birth, hospital numbers</p>	0	+1	+1 if appropriate	-1 if inappropriate	
<p><b>Blinding</b> Study described as double blind (+1)</p> <p>Appropriate (+1) if method described (e.g. identical placebo: colour, shape, taste)</p> <p>Penalty (-1) if trial described as double-blind and used an inappropriate</p>	0	+1	+1 if appropriate	-1 if inappropriate	

method (comparison of tablets versus injection with no dummy)					
<b>Follow-up</b> Study described withdrawals and dropouts (+1); if there were withdrawals, must be specified how many, from which group and for what reasons; if there were no withdrawals, must be specified that there were none	0	+1			
<b>Total sum of column scores</b>					

## Newcastle-Ottawa Quality Assessment for Scale Case Control Studies<sup>41</sup>

(A study can be awarded a maximum of one star for each numbered item in selection and exposure categories.  
A maximum of 2 stars can be given for comparability.)

### Selection

1. Is the case definition adequate?
  - a) yes, with independent validation\*
  - b) yes, e.g. record linkage or based on self reports
  - c) no description
2. Representativeness of the cases:
  - a) conservative or representative series of cases\*
  - b) potential for selection biases or not stated
3. Selection of controls:
  - a) community controls\*
  - b) hospital controls
  - c) no description
4. Definition of controls:
  - a) no history of disease (endpoint)\*
  - b) no description of source

### Comparability

1. Comparability of cases and controls on basis of design or analysis:
  - a) study controls for \_\_\_\_\_ (select the most important factor) \*
  - b) study controls for any additional factor\* (this criterion could be modified to indicate specific control for a second important factor)

### Exposure

1. Ascertainment of exposure:
  - a) secure record (e.g. surgical records)\*
  - b) structured interview where blind to case or control status\*
  - c) interview not blinded to case or control status
  - d) written self-report or medical record only
  - e) no description
2. Same method of ascertainment for cases and controls:
  - a) yes\*
  - b) no
3. Non-response rate:
  - a) same rate for both groups\*
  - b) non-respondents described
  - c) rate different and no designation

**Selection:** \_\_\_\_\_/4    **Comparability:** \_\_\_\_\_/2    **Exposure:** \_\_\_\_\_/3    **Total:** \_\_\_\_\_/9

## Appendix 6: Economic Review Data Extraction Form

<b>CCOHTA Teletriage Economic Evaluation</b>	
<b>Study Identification</b>	
Reference ID	
Author, title, journal name, publication date	
<b>Study Selection Criteria</b>	
Type of study	
Population	
Type of intervention	
Other reason for exclusion	
<b>Study Description and Methods</b>	
Study question: narrative	
Study population and size	
Intervention description	
Comparator	
Geographic location, currency, year of data	
<b>Analytic Methods</b>	
Analytical perspective	
Time horizon	
Technique of evaluation	
Discounting	
Type of sensitivity analysis Subgroup analysis	
<b>Data and Input Parameters</b>	
Health outcomes	
Clinical outcomes	
Primary and secondary	
Duration of follow-up	
Productivity changes and lost time by patient or provider of care	
Adverse events	
Data sources (gathered, derived or assumed)	
Health-related quality of life	
Outcomes	
Instrument and method	
Subjects' values elicited	
Costs	
Types of costs	
Data sources (for resource use and unit prices)	

<b>CCOHTA Teletriage Economic Evaluation</b>		
Other parameters and assumptions		
Data source and justification		
<b>Study Results</b>		
Results		
Key or base case results for:	Intervention:	Comparator:
<b>Health outcomes</b>		
Final visits/1,000		
Baseline		
Difference		
Incremental		
<b>Resource use</b>		
Final		
Baseline		
Difference		
Incremental		
<b>Costs</b>		
Final		
Baseline		
Difference		
Incremental		
Incremental cost-effectiveness ratio		
Standardized costs		
Sensitivity analyses results		
Subgroup results		
<b>Summary</b>		
Conclusions of author		
Conflict of interest		
Global impression of study quality (score one to five)		
Comments		

## Appendix 7: Introductory Letter for Canadian Survey of Call Centre Programs

February 7, 2003

Dear:

A team of researchers at the Canadian Coordinating Office for Health Technology Assessment (CCOHTA) ([www.ccohta.ca](http://www.ccohta.ca)) is inviting you to participate, on behalf of your program, in a survey designed to examine the health-related call centre programs in Canada and the need for such programs in jurisdictions without call centres. These call centre programs provide support by health care professionals via telephone to patients or the public for health-related problems.

This survey is part of a larger project focused on call centre programs that includes a systematic literature review to evaluate their clinical and economic impact. To determine the current Canadian initiatives, the survey focuses on the characteristics of the provincial and territorial programs, evaluation outcomes and challenges. It is based on a survey questionnaire coordinated by representatives from seven provinces and territories (Alberta, British Columbia, Manitoba, Northwest Territories, Nunavut, Saskatchewan, Yukon). Given the rapid advancements in call centre programs in Canada and the need to include all provinces and territories, this revised survey is now being undertaken.

We would appreciate a confirmation, preferably by e-mail to my attention, of your program's decision to participate in this survey by Wednesday, February 12, 2003. The deadline for completing the attached survey is February 21, 2003. Should you have further questions, please do not hesitate to contact me.

Thanking you in advance for your participation. I look forward to your reply.

Yours sincerely,

Hussein Noorani

Research team

- Dawn Stacey RN, MScN, doctoral student, Population Health Program, University of Ottawa
- Hussein Noorani MSc, research officer, CCOHTA
- Andrea Fisher RN, MSN, MSc, CCOHTA consultant
- David Robinson, PhD, Department of Economics, Laurentian University
- Janet Joyce MLS, director of Library and Information Services, CCOHTA
- Raymond Pong PhD, research director, Centre for Rural and Northern Health Research, Laurentian University

## **Appendix 8: Survey of Canadian Call Centre Programs for Health-related Issues**

### **Information Sheet**

#### **Purpose**

The purpose of this survey is to provide an overview of the characteristics of the Canadian call centre programs for health-related issues and to summarize findings from their evaluations. For provinces and territories without programs, the survey will summarize identified needs, progress toward development of a program and characteristics desired.

These call centre programs are defined, at a minimum, as the provision of support by health care professionals via telephone for troubleshooting the level of care required (including self-care) for health problems and the urgency for action. Other services may also be included such as providing information, managing acute symptoms, managing chronic conditions and coaching to help callers prepare for discussions about treatment options for medical conditions.

Findings from the current survey will be used, along with a systematic review, to inform policy makers, researchers and the public via routes such as the ministries, advisory committees, a publicly available CCOHTA report and peer-reviewed publications.

#### **Target**

This survey is targeting provincial and territorial Call centre programs in Canada that are available for most residents in the province or territory. The opportunity to identify other call centre programs for subgroups of the population will be provided.

#### **Procedure**

The following are the steps in the procedure:

1. for all jurisdictions, please complete section 1; and
2. for call centre programs, please complete section 2.

Please note that completing the survey may require calling on more than one person in your jurisdiction for input. For example, the person most responsible for the call centre would best be able to complete responses to section 2.

Please return your response and any accompanying materials by February 21, 2003 using fax, electronic mail or postal mail. CCOHTA will reimburse costs associated with the mailing of the survey and accompanying materials by postal mail (if accompanied by an invoice).

## Benefits of Participating

The possible benefits of participating in the survey are that your jurisdiction will be represented in the summary of results for this national survey and we will provide you with a copy of the published CCOHTA report. All relevant documentation provided by representatives of the call centre programs will be returned upon request at project completion.

## For More Information

If you have any questions regarding this survey, please contact Hussein Noorani, Research Officer and Project Manager, at CCOHTA (613) 226-2553 extension 252, [hussenn@ccohta.ca](mailto:hussenn@ccohta.ca).

## Research Team

- Dawn Stacey RN, MScN, doctoral student, Population Health Program, University of Ottawa
- Hussein Noorani MSc, research officer, CCOHTA
- Andrea Fisher RN, MSN, MSc, CCOHTA consultant
- David Robinson, PhD, Department of Economics, Laurentian University
- Janet Joyce MLS, director of Library and Information Services, CCOHTA
- Raymond Pong PhD, research director, Centre for Rural and Northern Health Research, Laurentian University

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**Please complete the following and return with the survey**

\_\_\_\_\_  
Name of participating call centre  
or jurisdiction

\_\_\_\_\_  
Signature of representative

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name of person(s) completing survey:

Role of person(s) completing survey:

Telephone:

Fax:

Mailing address(es):

E-mail address(es):

What is your preferred method for contact?  
(telephone, e-mail, fax, postal mail)

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**Section 1: To be completed by all jurisdictions**

1. Does your jurisdiction have a publicly funded call centre program available for most residents of the province or territory?  
 no       yes      *if yes, go to section 2.*

2. Has the need for a call centre program been identified for your jurisdiction?  
 no       yes

*If yes, at what point are the plans to initiate a program?*

We have begun to discuss possibilities for a call centre.

Plans are in place to initiate a call centre program.

Target date:

Other (*please specify*):

3. If you were to develop a call centre program, ideally, what services would be offered through your program? (*check all that apply*)

triage for a health issue, self-management and referral to appropriate professional care (primary, urgent, emergency)

coverage provided 24 hours a day, seven days a week

symptom management for acute symptoms

coaching or counselling for self-care

chronic disease management

*If yes, please specify conditions.*

provision of health information

coaching to prepare callers to discuss health related decisions with their practitioner

links to Internet sites for more information

self-care handbooks

patient decision aids (e.g. information on options, benefits and harms)

mail out information

appointment bookings

referral to physician offices or nurse-led health centres

referral to other health services such as public health

referral to on-call for home care

referral to physicians accepting new patients

link with emergency services (e.g. ambulance, fire department)

multilingual services

other (*please specify*):

4. Are you aware of other call centre-type programs in your province or territory? For example, cancer information service, physician group practices, HIV lines.

Type of Program	Population Served	Contact Information
• <input type="text"/>	• <input type="text"/>	• <input type="text"/>

## Section 2: To be completed by call centre programs

*\*If there is more than one call centre program, please complete a survey form for each one.*

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### A. Call Centre Program Services

- A1. Name of call centre program: [REDACTED]
- A2. What was the start date for service delivery of the call centre program?
- as a pilot project: [REDACTED] to [REDACTED]  
(month/year) (month/year)
- as an established program: [REDACTED] to [REDACTED]  
(month/year) (month/year)
- A3. What is the reach for the call centre program? (*check only one*)
- provincial or territorial
- regional
- other (*please specify*): [REDACTED]
- A4. What is the size of the population served by the call centre program? [REDACTED]
- A5. What are the goals and objectives of the call centre program? [REDACTED]
- A6. What are the hours of operation of these services? (*check only one*)
- 24 hours a day, seven days a week
- weekend and evening coverage (mostly out of regular hours)
- during regular hours only (Monday to Friday daytime)
- other (*please specify*): [REDACTED]
- A7. Are patients and public required to contact the all centre program before to going to emergency (for non-emergency), urgent care or a drop-in clinic?
- yes  no
- A8. Are follow-up telephone calls provided as part of the call centre program?
- yes, routinely
- yes, as needed
- no
- A9. Does the call centre program ask and record the pre-call intent to seek health care? (*check only one*)
- yes, routinely
- yes, during evaluation only
- no

- A10. What services are offered at the call centre program? (*check all that apply*)
- triage for a health issue: self-management and referral to appropriate professional care (primary, urgent, emergency)
  - symptom management for acute symptoms
  - coaching or counselling for self-care
  - chronic disease management. *If yes, please specify conditions.* [REDACTED]
  - provision of health information
  - coaching to prepare callers to discuss health related decisions with their practitioner
  - links to Internet sites for more information
  - self-care handbooks
  - patient decision aids (e.g. information on options, benefits and harms)
  - mail out information
  - appointment bookings
  - referral to physician offices or nurse-led health centres
  - referral to other health services such as public health
  - referral to on-call for home care
  - referral to physicians accepting new patients
  - link to emergency services (e.g. ambulance, fire department)
  - other services such as aboriginal health services, multilingual services
  - other (*please specify*): [REDACTED]

A11. Are calls documented?

- yes       no

*If yes, how are the calls documented?*

- on the computer
- on paper-based forms
- other (*please specify*): [REDACTED]

*If yes, is the caller's primary care physician sent a copy of the record of the call?*

- yes       no

## **B. Protocols**

B1. Do you use protocols for the call centre?

- yes       no      *If no, go to Section C.*

B2. Where did you obtain the protocol(s)? (*check only one*)

- developed our own
- purchased and used from (*please specify*): [REDACTED]
- purchased, then customized from (*please specify*):
- other (*please specify*): [REDACTED]

B3. How were the protocol(s) designed? (*check all that apply*)

- evidence-based: current evidence in the literature
- expert opinion
- not sure
- other (*please specify*): [REDACTED]

B4. Is there a process for ongoing update of protocols?

- yes       no

B5. How are protocols used?

- used primarily for orientation of new staff  
 used by staff as a reference (as needed) on their desk  
 integrated into documentation and triage system  
 other (*please specify*):

B6. Do protocols include guidance for coaching callers to prepare for discussions about health-related decisions with their practitioners?

- yes       no

**C. Staffing**

C1. How many staff are employed in the call centre program? Please indicate number of staff, whether they are employed full-time, part-time or casual; and full-time equivalents.

Staff Qualifications	Number			Full-time equivalents
	Full-time	Part-time	Casual	
Nurse				
Physician				
Pharmacist				
Administrative staff				
Volunteers				

C2. Who is the primary person handling most of the calls?

- nurse, please check education level required:  
 registered practical nurse or registered nursing assistant  
 registered nurse with college diploma  
 registered nurse with bachelor's degree (BScN, BSN)  
 nurse practitioner  
 advanced practice nurse with master's degree (MSN, MScN)  
 physician  
 pharmacist  
 administrative staff  
 volunteers

C3. Was an orientation provided for the staff?

- yes       no *If no, go to Section D.*

- C4. What methods were used for staff orientation?
- classroom on site
  - on-line
  - self-directed study
  - train the trainer or perceptor
  - other (*please specify*):
- C5. Does the orientation include guidance for coaching callers to prepare for discussions about health-related decisions with their practitioners?
- yes       no
- C6. On average, how many hours are provided for orientation of new staff?
- C7. Does the program include continuing education for staff?
- yes       no
- If yes, please explain.*

#### **D. Evaluation**

- D1. Is there a quality assurance program to monitor the quality of the service at the call centre?
- yes       no
- If yes, answer question D2, if no go to question D3.*
- D2. What are the key performance indicators being used to monitor the call centre program?
- Program indicators:
- response time for calls
  - access to other resources
  - use of self-care resources
  - use of evidence-based guidelines
- Caller indicators:
- deaths
  - health-related quality of life
  - certainty about decision to seek care (self-confidence and self-efficacy)
  - client satisfaction with the service
  - knowledge of health problem
  - attitude
  - behaviour change
  - increased control over chronic conditions
  - participation in health decisions
  - appropriateness of triage decision
  - calls managed by telephone advice and self-care alone

Access to services indicators:

- primary care contact with physician or nurse practitioner
- subsequent primary care contact
- urgent care or drop-in clinic use
- emergency department use
- hospital admissions
- days in hospital
- costs of services
- impact on self-care and informal care
- adherence to decision about level of care made during telephone consultation
- appropriate use of health services
- other (please specify):

D3. Has the call centre program been evaluated to assess its effectiveness?

- yes       no      *If no, go to Section E.*

D4. What type of evaluation was conducted? (check all that apply)

- client satisfaction survey
- external program review by consultants
- pre-post evaluation
- other research study (please specify):

D5. We have identified the following evaluation reports for call centre programs in Canada. Are there other publications (including peer-review papers) or unpublished reports on the evaluation of services for your call centre program?

- yes       no

*If yes, could you please send us a copy of the report with your completed survey?*

- yes       no

Jurisdiction	Report
British Columbia	Mullett J. <i>Partnerships for better health: A self-care pilot project: Final evaluation report, May 2000</i> . [Victoria]: British Columbia, Ministry of Health and Ministry Responsible for Seniors; 2000. Available: <a href="http://www.healthservices.gov.bc.ca/cpa/publications/evalfin.pdf">http://www.healthservices.gov.bc.ca/cpa/publications/evalfin.pdf</a> (accessed 2003 Nov 26).
Ontario	Pricewaterhouse Coopers, Ontario Ministère de la santé et des soins de longue durée. <i>Evaluation of primary care reform pilots in Ontario: Phase I, final report</i> . [Ontario]: The Firm; 2001.  Telehealth Task Force (ON). <i>Recommendations for a telephone health education and triage/advisory service: Final report to the Ontario Ministry of Health and Long-term Care</i> . Toronto: The Ministry; 1999.
Quebec	<i>Évaluation provinciale des services Info-santé CLSC: Recommandations finales du Comité de suivi pour le développement futur des services</i> . [Québec]: Ministère de la santé et des services sociaux, Direction de l'évaluation, de la recherche et de l'innovation; 1999.

Jurisdiction	Report
	<p><i>Évaluation provinciale des services Info-santé CLSC: Rapport final 1994-1999.</i> [Québec]: Ministère de la santé et des services sociaux, Direction de l'évaluation, de la recherche et de l'innovation; 1999.</p> <p>Lafrance M, Leduc N. La connaissance du service téléphonique Info-Santé CLSC chez les usagers des services d'urgence. <i>Can J Public Health</i> 2002;93(1):67-71.</p>
New Brunswick	<p>Robinson C. <i>Telecare/Télésoins: evaluation of New Brunswick's 1-800 dial-a-nurse service (region 1 pilot).</i> Fredericton: Program Analysis and Evaluation Unit, New Brunswick Department of Health and Community Services; 1998.</p> <p>O'Hanley P. Triage through technology: New Brunswick Tele-Care service reduces ER visits. <i>Hosp Q</i> 1997;1(2):46-7.</p>

D6. Based on the evaluation, what are three key strengths of your program?

█

**E. Costs**

E1. What is the approximate cost of the existing call centre program? Please specify what components are involved in these cost estimates.

- salaries (including all benefits paid on behalf of the employees)
- professional development and education
- ongoing technical maintenance and other office operational costs
- overhead (rent; utilities, e.g. telephone, heat, electricity and computer network charges)
- other (please specify): █

	Costs in Canadian Dollars	Year
Start up costs	█	█
Annual operational costs for most recent fiscal year	█	█

**F. Challenges**

F1. Did you experience any challenges during the planning and implementation of the call centre program?

- yes       no

*If yes, please tell us about those challenges and how they were resolved.*

█

F2. What are the current challenges and opportunities for improving the call centre program?

█

F3. Has there been any collaboration with other call centres?

- yes       no

*If yes, what type of collaboration?*

- sharing protocols
- sharing web-based information or written resources
- standardizing the orientation
- other (*please specify*): [redacted]

F4. Ideally, what additional services would be offered through the call centre program?

- coverage provided 24 hours a day, seven days a week
- symptom management for acute symptoms
- coaching or counselling for self-care
- chronic disease management. *If yes, please specify conditions.* [redacted]
- provision of health information
- coaching to prepare callers to discuss health-related decisions with their practitioner
- links to Internet sites for more information
- self-care handbooks
- patient decision aids (e.g. information on options, benefits and harms)
- mail out information
- appointment bookings
- referral to physician offices or nurse-led health centres
- referral to other health services such as public health
- referral to on-call for home care
- referral to physicians accepting new patients
- link to emergency services (e.g. ambulance, fire department)
- other services such as aboriginal health services, multilingual services
- other (*please specify*): [redacted]

F5. Are you aware of other call centre-type programs in your province or territory? For example, cancer information service, physician group practices, HIV lines.

Type of Program*	Population Served	Contact Information
• [redacted]	• [redacted]	• [redacted]

F6. Please add other information you think would be helpful.

[redacted]