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A Clinical and Economic Review of Telephone Triage Services and Survey of Canadian Call Centre Programs

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The Canadian Coordinating Office for Health Technology Assessment

A Clinical and Economic Review of Telephone Triage Services and Survey of Canadian Call Centre Programs

August 2004

This Overview is based on the Technology Report commissioned by CCOHTA: 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.* Ottawa: Canadian Coordinating Office for Health Technology Assessment; 2003. Technology report no 43.

REPORT *IN BRIEF*

August 2004

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 report available from CCOHTA's web site (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.*

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1 Introduction

In telephone triage (teletriage), health professionals provide support via telephone to clients who initiate calls about health concerns. The goal of teletriage is to assess the level and urgency of health care required. Teletriage is most commonly delivered by registered nurses (RNs), nurse practitioners (NPs) or physicians (MDs) in group-practice settings or by RNs in call centres that serve all residents of a region.

The use of teletriage has increased greatly in Canada during the past 15 years. Seven provinces offer call centres. The remaining three provinces and three territories all plan to implement such services in the future. Little is known, though, about the clinical effectiveness and cost-effectiveness of teletriage.

2 Objectives

This project has three objectives.

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

   primary outcomes
   - immediate health service use [office visits, home visits, emergency department (ED) visits, hospitalizations]
   - health service use in the days after 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
   - clients' satisfaction with the service provided
   - 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 and evaluations of Canadian teletriage programs.

3 Clinical Review

Methods

We performed a systematic literature search in the health databases MEDLINE®, CANCERLIT®, PsycINFO®, EMBASE®, PubMed, CINAHL and The Cochrane Library. These searches were performed in August 2002 and updated in February 2003. Reference lists of included articles were searched by hand. Because it is difficult to conduct randomized controlled trials (RCTs) of population-based programs, designs allowed in the protocol for the review included case control studies (CCS), pre-post test studies (PPS) and time series studies (TSS).

From an initial list of 3,172 unique citations (2,919 from electronic databases and 253 from hand searching), we retrieved 58 potentially relevant reports. Of these, 40 reports were excluded because their designs were not comparative or because they did not describe the interventions or outcomes specified in the review protocol. Thus, 18 reports were left for data extraction, from which 12 reports describing 10 unique studies form the basis of this study.

Two authors rated the quality of the 10 eligible studies. For the RCTs, the Jadad scale (possible values zero through five) was used to allocate two points for randomization, two points for blinding and one point for a description of withdrawals.[1] We evaluated the one CCS using the Newcastle-Ottawa quality assessment scale.[2] The two PPS and one TSS were assessed for the quality of their designs.[3]

Because the included studies varied in their designs, we did not try to pool data across studies. Publication bias was not assessed.

Results

a) Quality of Included Studies

None of the studies were blinded. All the RCTs were randomized; the overall mean Jadad score for quality was 1.8 out of a possible five. The allocation concealment was rated as adequate for four trials. The CCS received a low rating of one star out of a possible nine stars, while design weaknesses were found in the TSS and PPS.

b) Assessment of Clinical Impact

The results are summarized in Table 1.

Teletriage had an effect on health service use within 24 hours of the call. All six studies that evaluated the effect of teletriage on practitioner visits demonstrated a reduction in home and clinic visits. Two of three studies showed a decrease in ED visits as a result of teletriage. Of the four RCTs assessing the effect of teletriage on hospitalization, two studies found significant reductions and two found no difference in the rates of hospitalization within 24 hours of the call.

We found mixed results in the studies of the effects of teletriage on subsequent use (>24 hours post-call) of primary health care services such as visits to practitioners' clinics. There was no

evidence that teletriage had negative effects on patient safety as measured by subsequent hospitalizations and deaths.

About half the calls for health problems could be resolved by telephone advice alone. Callers' satisfaction with teletriage services ranged from 55% to 90%. Little is known about the effect of teletriage on health-related quality of life. None of the included studies examined access to other resources.

Discussion

In our systematic review, we found that little research has been done in teletriage. Most of the research has been conducted in the US or the UK. Its application to the Canadian context is limited by the methodological quality of the studies and by variation in the characteristics of the interventions, settings and practitioners involved. Of the 10 included studies, only four were of higher methodological quality.

The 10 studies consistently demonstrated that teletriage decreases immediate practitioner visits without increasing negative effects such as subsequent hospitalizations, subsequent ED visits and deaths. Less is known about the effect of teletriage on immediate ED visits, subsequent contact with practitioners and general health-related quality of life.

About half the calls for health problems could be resolved by telephone advice from RNs or practice MDs. Callers' satisfaction with teletriage services ranged from 55% to 90%.

Table 1: Summary of clinical 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[4] 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[5] 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[6] 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[7] 1999	PPS (n/a)	Immediate	11.7 visits per day	16 visits per day	Reduced by 27%	Not reported
		O'Connell[8] 2001	PPS (n/a)	Immediate	2,549 visits/ 1,000 people/ year for continuous enrolled members	2,683 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[9] 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[10] 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[11] 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[8] 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[4] 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[5] 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[9] 1997	RCT (1/5)	Immediate	47.2%	33.3%	13.9% increase	No difference, p=0.353
	MD teletriage versus no teletriage	Darnell[11] 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[9] 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[5] 1999	RCT (2/5)	Within 3 days	8/100	18/123	RR 0.55; 95% CI: 0.25, 1.20	No difference; underpowered
		Lee[12] 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[13]	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[6] 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[12] 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[13]	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[4] 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[5] 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[4] 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[5] 1999	RCT (2/5)	Within 3 days	3/100	2/123	RR 1.84 95% CI: 0.31, 10.83	No difference; underpowered
		Lee[12] 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[13]	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[6] 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[4] 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[5] 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

4 Review of Economic Studies

Methods

The systematic review search strategy used for clinical studies was also applied to identify studies of cost and cost-effectiveness. Two researchers assessed the quality of the included studies. The results were not pooled.

Results

No published Canadian studies were found. Three cost studies for teletriage by RNs were examined. These studies satisfied the quality criteria for the limited analysis undertaken.

One UK study[4] and one US study[8] demonstrated statistically significant cost savings for after-hours teletriage, mainly due to reductions in ED and physician visits. In the other UK study,[6] it was unclear whether the cost associated with RN teletriage during office hours led to savings, because the costs were similar for usual care and teletriage.

Discussion

There is little literature on the economic impact of teletriage and none that can be applied directly to the Canadian context. Our limited analysis suggests that in the UK and US, cost savings are significant for after-hours teletriage. These savings result from the diversion of clients from ED and MD services. Teletriage during office hours alone may not be cost-effective if ED visits increase in the long term.

The standards of evidence that apply to teletriage as an administrative procedure may be less stringent than those for new clinical procedures. In addition, the limited cost analysis undertaken in these studies ignores client and MD cost savings and other potential benefits. Nonetheless, an administrator may be justified in adopting teletriage even without a high level of confidence that direct payer costs will decrease.

5 Survey of Canadian Call Centres

Methods

Each of the 13 provincial and territorial jurisdictions received a survey accompanied by a cover letter explaining the rationale for the survey. The questionnaire was based on a previous survey (of seven provinces) and pilot testing of a draft in British Columbia.

Results

All 13 jurisdictions completed the survey (100% response rate). Within the last nine years, teletriage call centre programs were launched in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec and New Brunswick, with start dates ranging from July 1994 to September 2003. Saskatchewan's teletriage service (HealthLine) was not considered in the results section, given that it was implemented in September 2003 after completion of the survey of Canadian call centres. An eighth jurisdiction plans to initiate a call centre within one year. The five remaining jurisdictions

identified a need for teletriage services. All programs surveyed covered the whole jurisdiction; local programs were excluded.

Call centre programs are available to all residents 24 hours a day, seven days a week and are staffed primarily by registered nurses (RNs). RNs are guided by clinical protocols and provide consultation in the management for acute symptoms; referral to other services, such as emergency response; and health information. The objectives of individual RN call centres differ in the degree to which they promote self-care and informal care; and provide health education.

Program evaluations demonstrated high caller satisfaction (range 86% to 99%), decreased non-urgent ED visits in four jurisdictions (range −8% to −32%) and cost per triage call estimates of $10 to $27 (Tables 2, 3).

Discussion

Seven Canadian jurisdictions have province-wide teletriage call centre programs. The other six have identified a need. There are few evaluations of teletriage programs in Canada, with minimal evidence of their clinical and economic impact.

Table 2: Cost estimates of call centres

Juris-diction	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.

Table 3: Characteristics of call centre programs

Jurisdiction (program, start date)	Population Size (in millions)	Intervention	Hours	Call Before Seeking Care	Services Provided	Clinical Protocols	Nursing Orientation
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

6 Limitations

The term "teletriage" refers to interventions in a variety of studies and settings. Each program examined had different characteristics, making it difficult to compare findings. The following limitations were noted in the systematic review, the Canadian call centre survey and our attempt to integrate the review and survey findings.

- The models of teletriage found in the systematic review differed from those found through our survey of Canadian programs. Studies identified in the systematic review focused on RN or MD teletriage in practice settings serving a smaller population and were conducted in the US or UK. In Canada, all the teletriage services examined were provided by RN call centres serving the population of the jurisdiction.
- Evidence of the effectiveness or cost-effectiveness of teletriage programs in Canada was lacking.
- The 10 studies that the systematic review identified were of low methodological quality.
- For the evaluation of the clinical effectiveness of teletriage, the evidence that was higher in methodological quality came from studies conducted in group-practice settings. It is difficult to apply the conclusions to population-wide programs.
- Unit costs in Canada may differ from those used in the three economic studies included in the systematic review. As a result, the results should be applied cautiously to the Canadian context.

7 Health System Implications

There is minimal Canadian evidence of the effectiveness or cost-effectiveness of teletriage. As a result, such programs in Canada are likely to be begun on the basis of limited objective evidence from the UK and US; and subjective findings from the evaluation of Canadian programs, in the context of the specific needs of provincial and territorial health care systems.

The areas for improvement or expansion in teletriage include:

- further integrating call centre programs with primary care and monitoring the impact of teletriage on subsequent MD visits and repeat calls
- developing national guidelines[14] or accreditation standards[15] with quality indicators to facilitate comparisons across teletriage programs
- boosting the use of services by marketing them to groups such as rural residents, older persons, people with lower educational status and people with poorer self-rated health
- expanding programs to include chronic disease management
- improving support for self-care and informal care
- providing health information on topics such as drugs, poison control, pregnancy and HIV-AIDS; or urgent support in situations such as attempted suicide.

8 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 the number of immediate visits to physicians without causing adverse outcomes such as an increase in subsequent hospitalizations, ED visits or deaths. About half 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 one year 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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