



*Choice of EQ 5D 3L for Economic Evaluation of Community Paramedicine Programs Project*

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As articulated in the project Charter and PICOT Statement, the Economic Value of Community Paramedicine Programs Study (EV-CP) will seek to determine:

- The economic value of community paramedicine programs for clients and impact on specific services (e.g. EMS and ERs),
- The impact of CP programs on other community-based services, and
- The projected economic value of CP programs on global healthcare costs.

An additional literature review was performed in August 2015 through an approach which was strategically planned, extensive and focused to:

- Consider published best practices in evaluation of community and population based health and wellness initiatives and interventions
- Further inform the project evaluation methodology, particularly the analysis, to gain optimal results while introducing minimal experimental bias and effort needed by project participants
- Maximize generalizability of results across Canada and internationally and to follow on peer-reviewed published articles in community paramedicine

This second literature review (the first having been performed as part of the original methodology design, 2014) was undertaken by one member of the HFHG research team who performed this through consultation with experts in the field of paramedicine followed by a web search. Search engines employed were CINAHL and PubMed, the first step being the identification of relevant titles using various combinations of search terms 'community,' 'paramedicine' 'practitioner,' 'cost,' 'benefit,' 'economic,' 'Canada,' and 'value.' Abstracts from relevant articles were then reviewed and those warranting further exploration were read in their entirety. High quality articles thought to contribute to development and critique of the project methodology at hand were then included in the project library.

The over-arching purposes and context for this project were the major considerations in undertaking this literature review to further inform methodology. Community paramedicine in this project is hypothesized to be a new, value-added intervention to the current healthcare system. It is thought to be effective from an economic sense, among others, in both rural and urban scenarios; the extent to which economic value is comparatively realized in these environs is an additional aim of the project.

Within the last decade of Canadian healthcare, it has become popular to consider healthcare service as a value laden proposition and measure its effectiveness in that context. The previous view taken upon healthcare as mainly a cost to societies to be minimized while maintaining quality through increased efficiencies has given rise to:



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“often conflicting goals, including access to services, profitability, high quality, cost containment, safety, convenience, patient-centeredness, and satisfaction. Lack of clarity about goals has led to divergent approaches, gaming of the system, and slow progress in performance improvement (Porter 2010).”

Value, a product of measuring outcomes relative to costs, considers efficiency. Therefore, any healthcare trial which seeks to determine value of an intervention will inherently incorporate the influence of efficiency; the question remains as to how to define value in healthcare from this perspective. The cost of this intervention, community paramedicine services, is readily derived.

Value in this project will be measured for those patient groups with predominantly one of three chronic diseases, congestive heart failure, chronic obstructive pulmonary disease and diabetes and for the aggregate. Client participants in this study are all high intensity users of 911, emergency rooms and hospital admissions. Porter (2004) states “Providers tend to measure only what they directly control in a particular intervention and what is easily measured, rather than what matters for outcomes.” He further purports “For any condition or population, multiple outcomes collectively define success. The complexity of medicine means that competing outcomes (e.g., near-term safety versus long-term functionality) must often be weighed against each other.”

For this project, we have defined value through the use of Quality Adjusted Life Years. The term Quality of Life is highly subjective and varies considerably across nations and cultures; any instrument used to measure this must take into account local preferences for health (for example, is heart disease worse to have than arthritis in the UK?) as well as be valid and reliable across various disease states. For all reasons discussed to this point, the measurement instrument chosen is the EuroQuol Group’s EQ 5D 3L. As there to date has not been a Canada wide valuation of preference indices chosen, we are using the United States indices as our closest comparison.

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The 2012 Symposium Proceedings for Patient-Reported Outcomes Measurement in Alberta: Potential of the EQ-5D introduces the instrument as:

“The EQ-5D (‘EuroQuol – 5 dimensions’) is a patient-reported outcomes measure that captures five dimensions of health-related quality of life: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. It is appealing as a standardized health outcomes measure for Alberta because, as a generic measure, it is applicable to a wide range of health conditions and can be used as a research tool at both the population health and program levels, and has potential as a clinical monitoring tool. It is designed for completion by the patient, is quick and easy to use and adaptable for use in surveys, face-to-face interviews or the clinical setting. It is commonly used around the world in clinical, population health, health economics and research applications.”

Speaking to the current context of healthcare and research we are in, the Symposium acknowledges stronger rationale for obtaining patient-reported outcome measures (PROMs):

“the goal of a patient-centered healthcare system is to improve the health and functioning of patients...Moreover, self-care is an important part of healthcare, so obtaining some level of

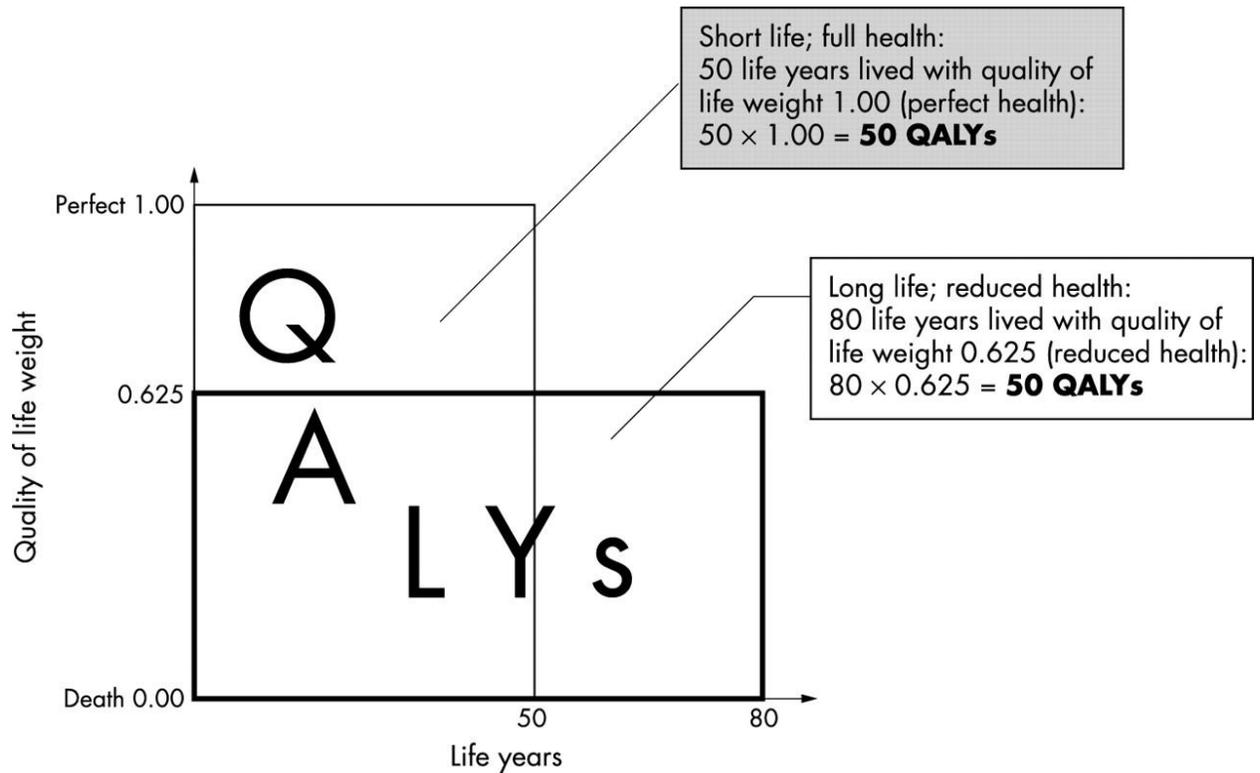


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measurement of patient health and health behaviors will be important for the overall evaluation of health and healthcare.”

In terms of this value approach to measuring interventions in healthcare, QALYs:

- Takes into account both the quantity and the quality (utility) of life
- Quantity refers to years lived, utility is measured as the EQ-5D converted to index numeric Values (QALYs) can be readily projected for interventions
- A year of perfect health is scaled to be 'worth' 1
- A year of less than perfect health 'worth' less than 1
- Death is commonly indicated by 0



The use of the EuroQuol represents but one method to inform decision makers regarding resource allocation surrounding interventions. Specific cost savings for elements of the healthcare system can be highly significant and relevant. Since they are readily measurable in most scenarios and represent such a significant outcome of health status, the number of hospitalizations and length of stay (LOS) days saved are often used in value measurements for interventions.



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Community paramedics, as a primary care provider, act at the interface of the patients and numerous other elements of the primary care system. It has been postulated that community paramedics (CPs) can stimulate use of underutilized, relatively inexpensive community based services. Since CPs have a broad knowledge of health conditions and associated service providers, it is also thought that client utilization of community services becomes more integrated and efficient.

As a final step in this review, thematic analysis was performed to list the questions the articles under review were attempting to address. This was performed to inform optimally comprehensive costing (cost savings) throughout the Hastings-Renfrew study as a result of community paramedicine.

Questions (in no order of priority) emanated as:

- Does community paramedicine act as a safe alternative to more expensive forms of healthcare?
- Does CP reduce 911 calls and ER visitations by clients by ambulance and on their own? Is off-load time reduced?
- Does CP have an effect on EMS service response times? Is it favorable, what is the mechanism and by how much?
- On visiting ERs, do clients require less diagnostic workup and time spent?
- Will CP reduce hospital admission rates and lengths of stay (LOS)?
- .....in this line of questioning, does CP provide a method for funding agencies to control paramedic costs in the face of aging demographics, increasing prevalence of chronic disease and population growth?
- Does CP promote more efficient use of community resources?
- To what extent does community paramedicine decrease demand on long term care facilities?
- To what magnitude does CP facilitate increased access to primary care physicians and their care teams (example Family Health Team)?
- To what extent does community paramedicine increase and improve communication among clients and their healthcare providers?

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While by no means comprehensive, these questions represent avenues for exploration through quantitative data collection and analysis. This has been planned to supplement the EQ-5D study.

There remains at least one significant challenge to the use of the EQ-5D in the analysis to be performed in our project. Inclusion criteria for participation mandate that clients have at least one chronic disease. Over the course of 12 months, one would normally expect disease progression and worsening of EQ-5D scores. The effect of CP may then turn out to not be improvement in QALYs but rather, less progression of the course of disease.

This will be uniquely addressed through regression analysis performed on one or a few quantitative indicators arising from the question list above.



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**Calculating the Economic Impact**

As noted previously, two methods for calculating economic impact have been chosen this study: activity-based-costing (ABC) and cost-utility analysis. ABC analysis will compare utilization between the control and intervention group using 3 years’ retrospective data and that produced in the study timeframe.

Cost-utility analysis will be calculated by comparing entry and exit study EuroQuols among the control and intervention group, individually and for the aggregate.

We are using the EuroQuol 5D 3L, usage of which was granted by the EuroQuol Group to this study on the basis of participant numbers and purpose.

As mentioned previously there are 5 levels (domains) which are as scored 1, 2 or 3. Accordingly, there are 243 potential combinations for the EQ 5D 3L. The EQ index is obtained in one of two ways: by finding the index numeric on the relevant country matching map of EQ 5D 3Ls to Indices or through an equation unique to the country (reflecting population preferences for health). We shall use both methods as a cross-checking effort.

EQ 5D 3L indices range from 1 through zero to -0.6. One (1) is perfect health, diminishing to zero (0) which is death and indices below zero represent states worse than death. This number is then multiplied by the value of one year’s life to arrive at a QALY score.

There exist country specific values for QALYs of one (1) year, in the range of \$30,000 for Canada.

Economic impact is then:

$$[\$QALY \text{ (study exit)} - \$QALY \text{ (study entry)}] = \text{Economic Impact}$$

Where for each group  $\$QALY = (\text{sum of each participant’s value of } \$30,000 \times \text{EQ index}) / (\text{number of participants in group})$

This will be calculated for the control and intervention groups separately. As noted earlier, given progressive disease, without intervention one would expect the impact score to be negative.

The control score is then subtracted from the intervention score. Our hypothesis is that intervention score will be > control score. Cost utility is then calculated by dividing this number by the marginal cost of the paramedic service. Cost effectiveness exists if this ratio > 0. Cost efficiency exists if the ratio is > 1 (one).

A number of further analytical possibilities exist to be explored in this study. In this project we will be performing this analysis for a rural area and an urban one and comparing values. Additionally, a variety of calculations could be performed to explore the impact on varying demographic profiles. The



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opportunity exists to perform this analysis to assess the impact of community paramedicine on the various chronic diseases included in this study.

Depending on the choice of inputs for the ABC analysis, one would expect a very strong correlation between results found using the two analytical methods. ABC will have the role of complementing and giving further meaning to the cost-utility analysis.

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