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Advancing the Ontario Stroke System

The Impact of Moving to Stroke Rehabilitation Best Practices in Ontario: A Preliminary Report

February 23, 2012

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Comment

This is a *preliminary* report.

Work is ongoing and information may be refined as further information becomes available.

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Stroke Statistics

Stroke is the 3rd leading cause of death in Canada and is the leading cause of adult disability & transfer from hospital to LTC

Annually, stroke in Ontario accounts for:

~20,000 ED visits

~15,350 acute hospital admissions

~3,000 inpatient rehabilitation admissions

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Objectives

- Provide a preliminary report on the potential economic impact of stroke rehabilitation recommendations made by the Rehabilitation and CCC Expert Panel
- To identify areas where further evaluation and validation of assumptions is necessary
- To comment on next steps

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The Rehabilitation and Complex Continuing Care (RCCCEP) Expert Panel

- Formed in December 2010 as a component of the ER/ALC expert panel
- Phase I focused on how to best reduce ALC length of stay in Ontario's healthcare system via better utilization of current resources
- Orthopedics and stroke were identified as priority populations
- The Ontario Stroke Network established a Stroke Reference Group to identify and recommend stroke rehabilitation best practices to the RCCCEP
- In June 2011, the panel released its phase I report outlining best-practice recommendations

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Best Practice Recommendations

The following recommendations were selected for evaluation*:

I. Timely transfer of appropriate patients from acute facilities to rehabilitation†
   - Ischemic strokes to rehabilitation by day 5
   - Hemorrhagic strokes to rehabilitation by day 7

II. Provision of greater intensity therapy in inpatient rehabilitation
   - 3 hours of therapy per day
   - 7-day a week therapy

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Best Practice Recommendations..cont'd

III. Timely access to outpatient/community-based rehabilitation for appropriate patients
   I. Early Supported Discharge with engagement of CCAC
   II. Mechanisms to support and sustain funding for outpatient and/or community based rehabilitation
   III. 2-3 outpatient or CCAC visits/ week for 8-12 weeks
   IV. Ambulatory rehabilitation provided as necessary

IV. Ensuring that all rehabilitation candidates have equitable access to the rehabilitation they need

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Evaluating the Best Practice Recommendations

General strategy in this report:

- Use the best available data from Ontario sources to model the current state of post-stroke rehabilitation in Ontario*
- Develop a general model for stroke care based on Best-Practice recommendations
- Use proposed model to identify areas where:
  - ER/ALC bed day consumption may be reduced or eliminated
  - Potential cost savings might be realized
  - Healthcare resources need to be re-allocated
  - Start-up investments may be necessary
- Evaluate the potential impact on acute, inpatient, and outpatient/community sectors separately†

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A Comment on Cost-Effectiveness

- The recommendations made by the RCCCEP are all based on best evidence or clinical consensus and will be assumed to lead to better patient outcomes*.
- This report will only address the impact of implementation of the recommended best practices on cost outcomes

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Acute Care Cost Impact

Recommendation*:

- *Mean* acute LOS for ischemic stroke and TIA = 5 days
- *Mean* acute LOS for hemorrhagic stroke = 7 days
- Elimination of all acute ALC bed days among these patients

Assumption:

System-wide collaboration and co-ordination will allow current challenges to earlier discharge to rehabilitation (e.g. completing diagnostic tests, 7 day/week admits, completing the AlphaFIM® Instrument) to be resolved over time

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Acute Care Cost Impact

Cost estimates for reduced acute LOS:

- Data from the Ontario Case Costing Initiative was used to estimate the *per diem* cost of a single ALC bed day and this estimate was used to generate a conservative estimate for a single day reduction in acute LOS*. Estimates were calculated by summing the mean costs for relevant cost centers for each diagnosis separately based on the "typical" case

Cost estimates:

- Include - Food service (including tray assembly and distribution), medical inpatient services (including nursing), clinical nutrition, physiotherapy, occupational therapy, speech language pathology, social work
- Exclude - Surgical care, acute medical care, diagnostic tests, laboratory services etc.

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Acute Care Cost Impact

Cost results:

Per diem acute LOS cost estimates are as follows†:

Ischemic stroke (ICD-10 codes I63,I64*) - $591.52

TIA (ICD-10 code G45.9) - $656.58

Hemorrhagic (ICD-10 codes I61,I62)- $576.64

*I64 (unspecified stroke) - included as ischemic since mean *per diem* acute costs were closest to ischemic values.

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Acute Care Cost Impact

Total Estimated Impact* 100% attainment of best-practice recommendations would lead to:

18,605 acute ALC bed days made available (51 beds)

20,256 additional acute bed days made available (55.5 beds)

Total Beds = 106.5

$22,928,130 acute healthcare dollars saved†

Inpatient Rehabilitation Cost Impact-Greater Therapy Intensity

Recommendation:

II. Provision of greater intensity therapy in inpatient rehabilitation
    I. 3 hours of therapy per day
    II. 7-day a week therapy

Assumptions:

- A staff:bed ratio of 1:6 for PT and OT will be needed to achieve 3 hours of therapy/day*
- A ratio of 1:12 for SLP is sufficient given that not all patients require SLP services†

Inpatient Rehabilitation Cost Impact-Greater Therapy Intensity

3-hours of therapy/day - calculating therapist shortage:

- Results from a 2009 survey of Ontario inpatient rehabilitation units for PT,OT, and SLP staffing was assumed to represent current staffing levels*
- Rehabilitation facilities were assumed to operate at 100% occupancy
- The current staff:bed ratio was then compared to the proposed staffing ratios noted previously (1:6 PT/OT, 1:12 SLP) to estimate current staff shortages

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Inpatient Rehabilitation Cost Impact-Greater Therapy Intensity

Estimating cost of addressing therapist shortage in Ontario:

- The cost of filling the staffing gap was estimated assuming hiring of PTs, OTs, SLPs and assistants as necessary*
- For general rehabilitation beds, 35% stroke occupancy was assumed (based on the reported stroke occupancy in units where data was available)
- If stroke dedicated and general beds both existed on a unit, general beds were assumed to have 0% stroke occupancy†
- Cost estimates were based on mean therapist salaries + 25% benefits

Inpatient Rehabilitation Cost Impact-Greater Therapy Intensity

Estimated mean cost of 1 therapist FTE in Ontario (including 25% for benefits)*:

PT – $84,500

OT – $84,500

SLP - $90,200

Assistants

PTa - $52,080

OTa - $52,080

CDA - $53,688

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Inpatient Rehabilitation Cost Impact-Greater Therapy Intensity

Therapist Calculation Results:

Current therapist staffing levels in Ontario rehabilitation units who care for stroke patients*:

- **PTs – 126.1, OTs – 110.9, SLPs – 42.7**

Estimated staffing shortage (for 3 hours of therapy/day for stroke patients):

- **PTs – 35.2, OTs – 41.5, SLPs – 36.1**

Annual cost of additional staff:

- **$8,557,831**

Inpatient Rehabilitation Cost Impact-Greater Therapy Intensity

Weekend Therapy Staff Calculation:

- Assume full staff complement required on weekends (PT, OT, SLP, assistants)*
- Calculate full best-practice weekday staffing complement (PT,OT,SLP) for stroke patients assuming 35% stroke occupancy in general rehabilitation beds
- Multiply best-practice weekday staffing compliment by 28.5% (2/7) to estimate staffing needed on weekends
- Multiply weekend staffing estimate by mean annual salary (+ $1.55/hour premium for weekend and 25% benefits)

Inpatient Rehabilitation Cost Impact-Greater Therapy Intensity

Weekend Therapist Calculation Results:

Current estimate of full weekday complement for stroke patients (current staffing levels plus additional staffing estimates to achieve best-practice ratios):

- **PTs – 104.7*, OTs – 103.5*, SLPs – 64.0**

Staff shortage:

- **PTs – 29.9*, OTs – 29.6*, SLPs – 18.3**

Annual cost of additional staff:

- **$6,041,390**

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Inpatient Rehabilitation Cost Impact-Greater Therapy Intensity

Best-Practice Staffing Summary:

Making 3-hours of therapy a day, 7 days a week available to every stroke patient admitted to inpatient rehabilitation in Ontario will require an estimated annual reallocation of funds. Reflects an overestimation as therapy assistants were not included in additional staff calculations.

$14,599,221

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Inpatient Rehabilitation Cost Impact-Improved Efficiency

The following section further explores the combined impact of earlier access to inpatient rehabilitation and intensification of inpatient rehabilitation

Assumptions*:

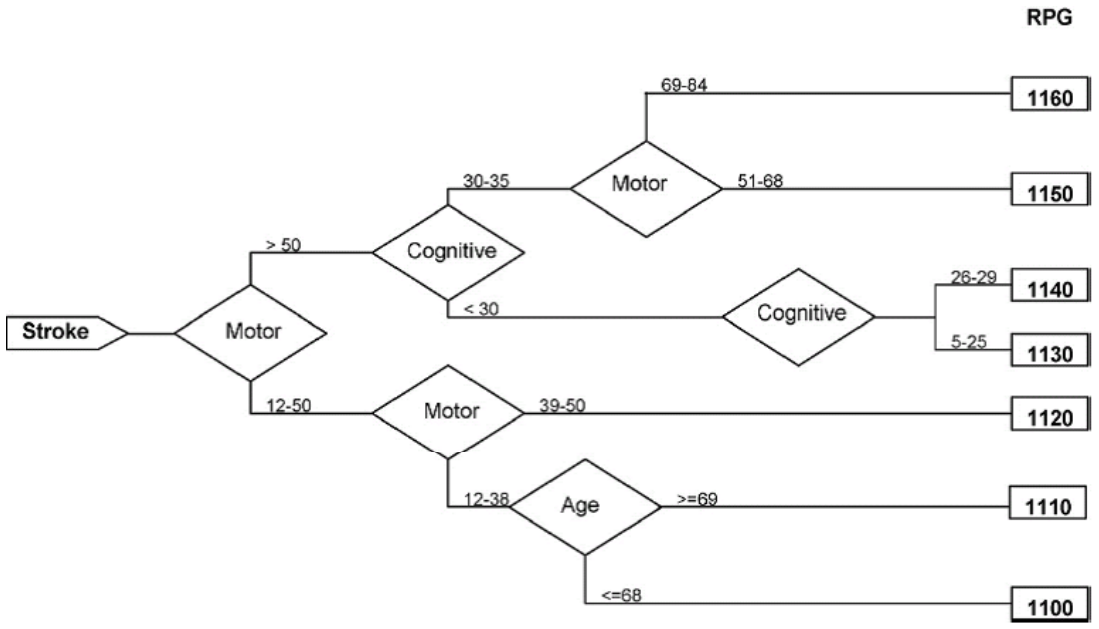
- Admitting patients to inpatient rehabilitation earlier will result in greater acuity during rehabilitation and may require longer rehab LOS than currently seen

However:

- Greater therapy intensity will improve the rate of functional recovery
- Weekend therapy will further improve the rate of functional recovery
- Improved access to outpatient and community rehabilitation will facilitate earlier transitions to the community

Inpatient Rehabilitation Cost Impact-Improved Efficiency

- Inpatient rehabilitation estimates were calculated separately by Rehabilitation Patient Group (RPG)*



Motor = motor FIM score (-tub/shower transfer), Cognitive = cognitive FIM score

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Inpatient Rehabilitation Cost Impact-Improved Efficiency

Estimating the impact of improved efficiency:

Greater Acuity: patients will be assumed to arrive at rehabilitation in the next most severe RPG (eg. pts currently arriving in group 1130 will arrive in group 1120) and will require the LOS of this more severe group in rehabilitation (LOS estimates for group 1100 will remain the same as this is the most severe group)

Greater intensity/weekend therapy: it will be assumed that the combination of 3-hr/day therapy 7-days a week will reduce overall rehabilitation LOS by 1 day for every week in rehabilitation (ie. a 14% reduction in overall LOS)*

Outpatient/community rehab: it will be assumed that no patient will stay in inpatient rehabilitation with a FIM score greater than 100 and patients in RPG 1160 would receive their rehabilitation in the community

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Inpatient Rehabilitation Cost Impact-Improved Efficiency

Cost calculations:

Estimates of potential cost savings are calculated on a *per diem* basis compared to current LOS. Estimated savings are calculated using the 2008 rehabilitation *per diem* adjusted to 2011 values resulting in a daily cost estimate of $603/day*

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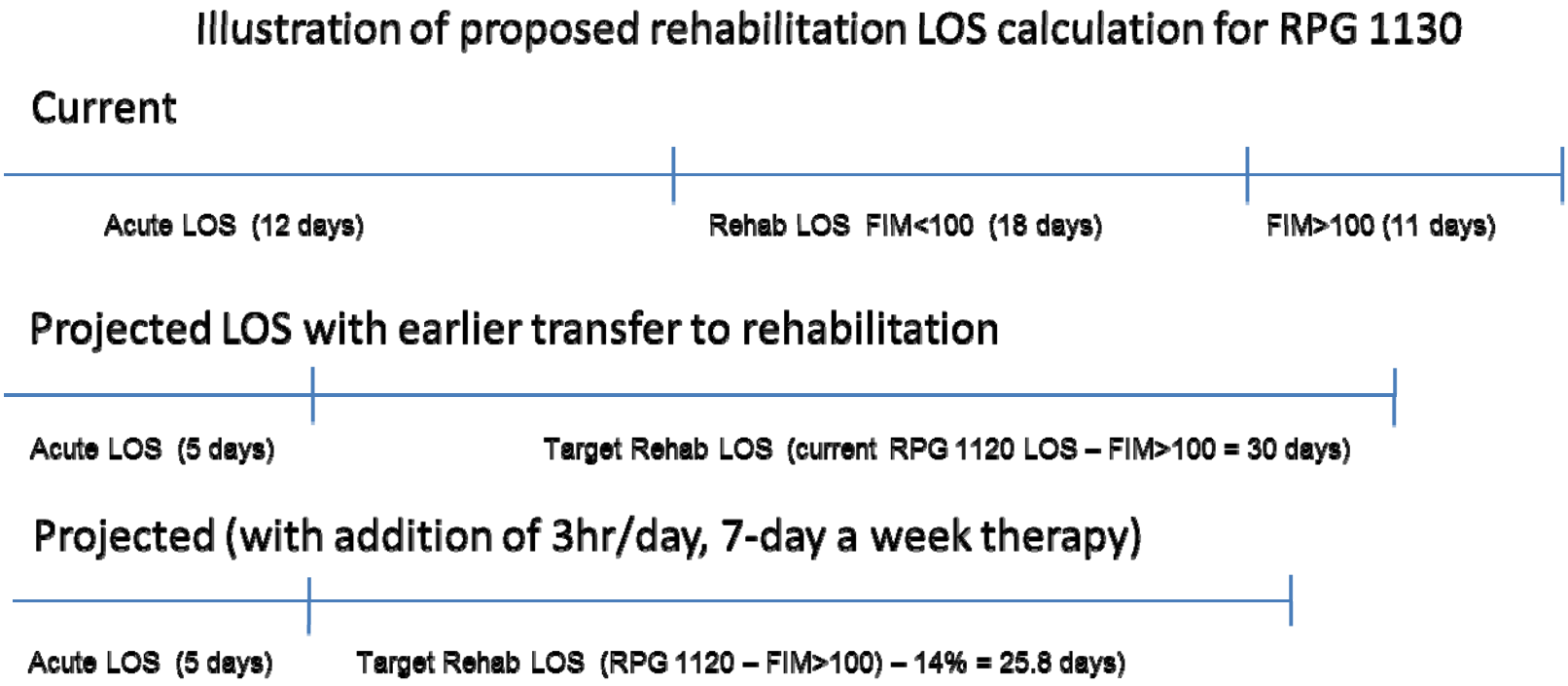
Inpatient Rehabilitation Cost Impact-Improved Efficiency

LOS reductions with assumed impact of 3hr/day, 7 day a week therapy:



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Inpatient Rehabilitation Cost Impact

RPG		N	Current LOS	Revised LOS Target	Δ Rehab Bed Days
Mild	1160	246	15.1	0	-3715
	1150	416	21.3	8.2	-5450
Moderate	1140	341	24.1	17.2	-2353
	1130	541	29.2	25.8	-1839
	1120	743	35.1	34.5	-446
Severe	1110*	687	42.6	42.6	0
	1100*	341	53.1	53.1	0

- Table presents 2010 values for number of patients admitted to inpatient rehab, current LOS, revised LOS and the estimated impact on inpatient rehabilitation bed days relative to current values (N x current LOS) - (N x revised LOS).

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Inpatient Rehabilitation Cost Impact-Improved Efficiency

Using revised LOS targets for each RPG, with no patient remaining in rehabilitation with a FIM>100, and assuming a 14% reduction in LOS via 3hr/day therapy, 7-days a week, the estimated impact is:

- 13,803 rehabilitation bed days made available (37.8 beds)

Using RPG targets $8,323,209 healthcare dollars made available

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Inpatient Rehabilitation Cost Impact-Improved Efficiency

Total Impact on Inpatient Rehabilitation Sector:

- 13,803 bed days made available (37.8 beds) =$8,323,209 made available through greater efficiency
- $14,599,221* in staffing required

Net cost of greater therapy intensity to efficiency gains = additional annual investment of $6,276,012

Inpatient Rehabilitation Cost Impact- Considerations

- This report focuses on the RCCCEP recommendations for rehabilitation therapy intensity and therefore does not address the need for additional Nursing, Social Work, Psychology, Physicians, Pharmacy or Housekeeping staff that may be necessary for 7-day/week admission and service and costs for replacement of therapy staff when sick or on holidays

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Inpatient Rehabilitation Cost Impact- Considerations

- Only patients discharged home were included in estimates of reduced rehabilitation LOS. Exploration of the impact of reduced LOS among patients discharged to LTC will be included in **the final report**
- Uncertainty remains about the assumed SLP:bed ratio of 1:12. Further research will be necessary*.
- Using the methodology applied here, adjusted LOS expectancy among patients in RPG 1100 was left the same since no more severe RPG group exists.

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Inpatient Rehabilitation Cost Impact- Considerations

- Ontario research suggests that many facilities across the province currently use complex continuing care (CCC) beds to provide rehabilitation to patients after stroke. This report does not address the care of these patients primarily because patient information is sparsely available. Future work will be conducted on this group to seek useful data sources and incorporate this information into a more detailed best-practice model. However, similar potential for impact on ER/ALC and rehabilitation LOS reduction is expected in this group.

Outpatient / CCAC Rehabilitation Cost Impact

Recommendation:

III. Timely access to outpatient/community-based rehabilitation for appropriate patients

I. Early Supported Discharge (ESD) with engagement of CCAC

II. Mechanisms to support and sustain funding for outpatient and/or community based rehabilitation

III. 2-3 outpatient or CCAC visits/ week for 8-12 weeks

IV. Ambulatory rehabilitation provided as necessary

Outpatient / CCAC Rehabilitation Cost Impact

Assumptions:

- Based on the best available Canadian data, it will be assumed the 13% of patients discharged home from an acute hospital require OP/CCAC rehabilitation*
- 100% of patients discharged home from inpatient rehabilitation will be assumed to require OP/CCAC rehab
- Due to a lack of data, it will be assumed the 50% of patients currently discharged from inpatient rehabilitation currently receive adequate OP rehabilitation†
- Many CCAC's report only having sufficient resources to address safety issues and education, therefore, CCAC rehabilitation resources will not be considered sufficient to qualify as an Early Supported Discharge program‡

Outpatient / CCAC Rehabilitation Cost Impact

Cost estimate for OP/CCAC rehabilitation:

- The primary cost estimate for a post-stroke ESD program will be taken from Teng et al. (2003)*
- This Canadian study calculated the cost of a 4 week ESD program at $942.87
- The program included mean total visits of: 2.3 nursing, 5.5 PT, 3.5 OT, 1.29 SLP, 0.17 DT
- The cost estimate includes overhead and travel costs

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Outpatient / CCAC Rehabilitation Cost Impact

Adjustments to the cost estimate for OP/CCAC rehabilitation*:

- The RCCCEP recommend 2-3 visits of therapy per week (Teng cost estimate doubled)
- The RCCCEP recommend 8-12 weeks of ESD (Teng estimate multiplied by 2.5)
- The Teng estimate was from 1997 (Teng estimate adjusted for inflation using the Bank of Canada inflation adjustment calculator)

Result: $942.87 x 2 time intensity x 2.5 duration (adjusted) **= $6297.42 / patient**

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Outpatient / CCAC Rehabilitation Cost Impact

Rehabilitation Patient Data (2010)*		Additional OP/CCAC rehab candidates
Acute discharges home	7365	603
Candidates for OP/CCAC rehab (estimate)	957	
Patients currently receiving referral to OP rehabilitation on acute discharge (estimate)	354	
Patients admitted to inpatient rehab in RPG 1160	246	123
Patients in RPG 1160 currently receiving outpatient rehabilitation (estimate)	123	
Discharges home from inpatient rehab	3302	1651
Patients receiving outpatient rehab currently (estimate)	1651	
Additional need for OP/CCAC rehabilitation		**2377**

Outpatient / CCAC Rehabilitation Cost Impact

Attaining 100% adherence to best-practice recommendations for outpatient and CCAC rehabilitation:

- Resources to provide 2377 additional candidates outpatient/CCAC rehabilitation annually will be necessary

An annual investment in outpatient/CCAC rehabilitation of $14,968,967 is required

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Outpatient / CCAC Rehabilitation Cost Impact-Considerations

- The current lack of information regarding outpatient & CCAC rehabilitation across the province presents a huge challenge. Estimates related to current resource availability in this sector will need to be addressed.

- Wait times associated with OP/CCAC rehab have been noted as a barrier to accessing these services. Model adjustment will be necessary to allow some "surge capacity" in this sector to facilitate transitions.

- Further research is necessary to identify which patients are best served by outpatient rehabilitation vs. CCAC rehab, where these patients live, and how best to meet these varied needs. Cost estimates will need to be adjusted accordingly.

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Moving to Stroke Rehabilitation Best Practices in Ontario: Preliminary Report

Acute Sector

- ~38,861 acute bed days eliminated
- ~$22,928,130 made available

Inpatient Rehab

- ~13,803 rehab days made available
- ~$14,599,221 in additional staffing costs required
- ~$8,323,209 saved through greater efficiency

Outpatient/CCAC Rehab

- ~2377 additional patients need services
- ~$14,968,967 in additional annual costs required

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Preliminary Best-Practice Model Summary

Based on 100% attainment of the best-practice model for stroke rehabilitation in Ontario, the estimated net annual budgetary impact is:

$1,683,151

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Summary of Additional Considerations

The following table denotes additional considerations that have not yet been addressed here, but have potential to alter the cost estimates noted in this report

Considerations leading to additional cost	Considerations leading to additional savings
Additional acute/ rehabilitation staff to meet discharge targets and provide 7-day a week discharges (allied health, pharmacy, housekeeping, physicians etc.)	Acute savings beyond ALC cost estimates
	Reduced rehabilitation LOS among most severe patients (RPGs 1100 and 1100)
Transportation between rehab and acute facilities where necessary	Fewer LTC discharges resulting from better access to rehabilitation
Additional equipment in rehabilitation to manage greater acuity	Reduced acute and rehab LOS among patients currently cared for in CCC
Additional staff in rehabilitation to manage greater acuity (RNs, NPs, physician assistants	The O/P, CCAC cost estimate is likely high

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Discussion

- This report was designed to outline a high-level, provincial model for application of RCCCEP recommendations. Future work will seek to refine estimates and assumptions as well as provide sensitivity analyses.
- While development of a more refined statistical model will provide better estimates of effect, the validity of all assumptions will not be confirmed without real-world application. Work will continue with decision makers across the province to promote better adherence to best-practice recommendations and to evaluate their impact. It is likely that investment will need to be made in some sectors (e.g. OP rehab) before the noted benefits can be realized

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Discussion – cont'd

- Whenever possible, overestimates of necessary spending and underestimates of cost savings were used.
- There remain a number of areas where it is apparent that investment will be necessary (eg. acute staffing), as well as some where additional cost savings are likely (e.g. reduced LTC discharges).
- Estimates suggest that the overall impact of adopting the RCCCEP recommendations on ER/ALC bed days is substantial.
- The estimated $1.7M saved is also predicted to result in better healthcare utilization and better patient outcomes
- Further evaluation of reduced costs relating to improved quality of life and reduced institutionalization will be needed

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Next Steps

- Work with HQO and to develop a collaborative final report by April 2012 with a focus on:
  - Refining estimates
  - Confirming assumptions where possible through more detailed model development
  - Establishing LHIN-based models

- Through our collaboration with HQO Seek opportunities to collaborate with Research in Health Care Engineering & OHTAC in their stroke best practices

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Next Steps

- Comparison of the impact of matched patients for those that do and don't receive rehab in collaboration with ICES*
  - include an estimate of the impact of moving to best practices on LTC avoidance
- Complete acute/rehab focus group formal report (March 2011)
- Continue regular meetings of stroke reference group to provide project oversight