



<b>Title</b>	<b>Cost Estimation of Stereotactic Radiosurgery: Application to Alberta</b>
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## Aim

To provide economic information to decision makers in Alberta Health and Wellness on the most cost-effective way to offer stereotactic radiosurgery (SRS) services to neurosurgical patients.

## Conclusions and results

Cost estimates were provided for 3 main SRS technologies: Gamma Knife (GK), CyberKnife (CK), and LINAC (Novalis). An estimated 100 to 185 patients per year would be eligible for SRS, not including patients who might be referred for SRS from other provinces.

The cost model used the annuity method to distribute investment and opportunity costs over the lifetime of the equipment. A 0% interest rate and 100 patients treated annually would yield an average cost per patient of CAD 14 567 for GK, CAD 14 889 for Novalis, and CAD 16 690 for CK. Considering travel and hotel expenses, lost earnings for patient and caregiver (estimated at CAD 1600), and cost of the procedure (estimated at CAD 15 000) in Manitoba, the option of establishing a dedicated unit in Alberta is attractive. These costs are more than double if the patient is treated in the United States.

At an annual volume of 100 patients, the total healthcare cost per patient would be CAD 16 210 for Novalis, CAD 16 856 for GK, and CAD 18 187 for CK. At that operational level, healthcare resources would not be efficiently used due to excess capacity of the SRS team and equipment.

While there is no significant difference between the costs of establishing dedicated GK or Novalis units in Alberta, a CK unit would be significantly more expensive than either of these two models. A CK unit, however, could be used to treat tumors beyond the head and neck.

## Recommendations

A GK-based SRS unit will become operational in Manitoba in 2003. This unit has an estimated annual capacity of 600 patients and will probably treat patients from Alberta and British Columbia (estimated cost of

CAD 15 000 per patient). Quebec is also considering the purchase of a unit. If Alberta were to invest in a dedicated SRS unit, it is unclear whether Canada would have sufficient workload for 3 SRS units. Hence, if the caseload and case mix are insufficient to make the SRS business case economically sustainable, Alberta should consider other sustainable alternatives for neurosurgical patients.

## Methods

Cost minimization analysis was used for cost comparisons, which assumes that the effectiveness of the assessed technologies is equal. This assumption was supported by 2 Canadian reviews, which concluded that the effectiveness of GK and Novalis did not differ significantly from each other, or from conventional microsurgery.

The SRS cost estimate was based on a hypothetical cost model, so most of the cost factors and their values were not directly measured in a real life situation. This approach was taken because there was no dedicated neurosurgical SRS unit in western Canada at the time of the analysis. It was assumed that the technologies were mainly used for neurosurgery in patients with head and neck tumors only, some of whom would be suitable for SRS.

## Further research/reviews required

The field of SRS is changing rapidly, which makes the projection of caseloads in Canada difficult. Additional cost estimations that address the impact of an SRS unit in Winnipeg would be helpful.