Abstract

INTRODUCTION: Every 120-204 French are suffering from a stroke. One year mortality rates are around 23%; for cerebral infarction and 50% for cerebral haemorrhage. The sequelae from the serious pathophysics are often extremely persistent with the consequence that individuals who survive a stroke require treatment in all types of care facility in the French healthcare system. METHODS: The stroke path within the healthcare system has been simulated, using a Markov modelling. The chosen length of the simulation is 5 years, which means 20 cycles of 3 months. Markov states were derived from clinical elements of the disease; probability of the patients (Bath index) and pathways of care (rehabilitation centers, home, geriatric institutions). These disability levels were picked up in each path, using the Barthel index. There are 4*(2+3*3) clinical status, making 45

Methods

1. Markov models

- Analytic approach:

Four clinical states were defined: first ischemic attack, first cerebral haemorrhage, ischemic recurrence, haemorrhagic recurrence; haemorrhagic recurrence.

Every year, 120,000 French are suffering from a stroke. Five states defined: first ischemic attack, first cerebral haemorrhage, ischemic recurrence, haemorrhagic recurrence, rehabilitation. The incidence approach is the only one that allows a reflection on the conditions of a future change of the costs. An implementation requires a global approach of the disease.

- Model n° 1: 30 month

  Length of simulation: 30 months, in 30 cycles of 1 year.
  Early mortality rates.
  Transition probability by facility type (home, rehabilitation, cardiac centers).

- Model n° 2: 30 months

  Length of simulation: 30 months, in 30 cycles of 3 months.
  Markov states defined from clinical elements that characterize the evolution of the pathology and the leases of autonomy observed for each place of care.

- Model n° 3: Budget Impact to 5 years

  Excel simulation using an annual incidence of 120,000 to 140,000 patients.

2. Calculation of probability and mortality rates

- Analysis of the database collected from 328 stroke registry (specific mortality, recurrence rate - patients trajectory according to the Barthel index).

- Analysis of the file from (first quarter): 1000 patients trajectory according to the Barthel index.

- Mortality rates in France using age group (source INSEE).

3. Use of supplies


4. Statistical analysis

Estimation of both mortality and recurrence rate using the Kaplan Meier and survival methods (weekly and quarterly rates).

Results

1-Mortality and recurrence rates

- 1.94 months: Analysis of total (1000) patients were selected. These patients are from 15 to 70 years old. The analysis allowed calculation of mortality rates during the first 1.94 months, in which 15% of the patients died on average within 1.94 months of the stroke, 30% in 3 months, 45% in 6 months.

- 3.12 months: Stroke registry (1000): 1000 patients were selected and followed for a year, including 1000 recurrent stroke patients.

- 12 months: Mortality and recurrence rates between 1 and 5 years were estimated from 2 articles of literature.

2-Patients pathway

- 5.9 months: Analysis of total (3000) patients after 30 months after hospitalization, 31% were in rehabilitation, 25% in home care, 20% were still hospitalised.

Conclusion

The Markov model allows estimating the cost of the different pathways of patients 5 years after the attack. This estimation needs a meticulous search for inflows on patients pathways through healthcare system. The analysis of databases (Registres, PMI, clinical trials ...) allows an access to the exact informations (Mortality, incidence, duration of stay, probability of transplant and unit costs) which are necessary to calculate the real cost of the disease. By adapting them to the French specificity, foreign surveys can also contribute to that calculation. The increase of the population and the delay in the treatment are factors that determine the future increase of the costs. A future change of the pathway of care could lead to a future change of the costs. An implementation requires a global approach of the disease.