

Budgetary Impact Analysis of Recombinant Activated Factor VII in the Treatment of Intracerebral Hemorrhage: A US Health Plan Perspective

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Introduction

- Intracerebral hemorrhage (ICH) is the deadliest form of stroke¹, resulting in mortality and severe disability among survivors.
- ICH events impose a significant economic burden due to intense medical resource use during acute treatment as well as the cost of long-term management of survivors.²⁻⁶
- Currently, no drug therapies have been proven effective for treatment of acute ICH.
- Recombinant activated factor VII (rFVIIa) is currently indicated for treatment of bleeding episodes in hemophilia A or B patients with inhibitors to Factor VIII or Factor IX. A recent Phase IIb clinical trial showed that administration of rFVIIa within 4 hours of ICH onset reduced mortality and improved 90-day functional outcome compared to standard care.⁷

Objectives

To examine the health plan budget impact of introducing rFVIIa as a novel treatment for ICH.

Methods

Patient Population

Patients entering the emergency room with acute ICH within 3 hours of symptom onset.

Patient characteristics:

- Age distribution typical of published ICH patient populations.^{5,8}
- ICH severity, disease history, and eligibility for rFVIIa is assumed to be similar to those in the clinical trial.⁷
- Patient weight of 70 kilograms.

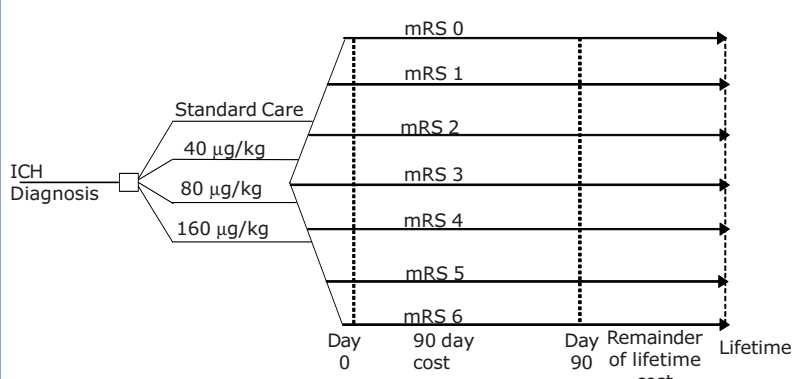
Study Design:

- Budget impact model adapted from previously developed decision-analytic model estimating the cost-effectiveness of rFVIIa 40, 80, or 160 µg/kg in acute ICH⁹ (Figure 1).
- Budget impact model estimates the impact of introducing rFVIIa on a health plan's budget from a US managed care perspective (assumes health plan of 1,000,000 patients).
- Number of eligible new ICH cases estimated to be 52 patients per year.
- Patients followed for 90 days after ICH onset, and annually thereafter for the remainder of lifetime (Figure 1).
- Drug costs are based on wholesale acquisition costs (WAC)⁸:
 - 40 µg/kg: \$3,444
 - 80 µg/kg: \$6,888
 - 160 µg/kg: \$13,766
- Functional status, measured by modified Rankin Score (mRS) estimated 90 days after ICH onset, based on clinical trial data.⁷
 - mRS 0: No symptoms at all
 - mRS 1: No significant disability
 - mRS 2: Slight disability
 - mRS 3: Moderate disability
 - mRS 4: Moderate severe disability
 - mRS 5: Severe disability
 - mRS 6: Death
- Costs include: drug cost, inpatient stay, skilled nursing facility costs, and additional medical management costs.^{8,9,11-14}
- Post-90 day costs estimated annually based on mRS score using multipliers obtained from published literature (Table 1).⁹
- Per-day hospitalization costs: \$2,487 for survivors, \$2,084 for those who die.¹²
- Post-90 day base annual medical costs (mRS 0-2): \$6,921.¹²
- Percent of ICH patients eligible for rFVIIa treatment: 17.5%.¹⁵
- Uptake of rFVIIa is assumed to be 30% in first year after introduction of rFVIIa. Uptake of rFVIIa assumed to increase 5% each year (to 50% in year 5).

Sensitivity Analysis

- One-way sensitivity analyses performed on key input parameters.
- Parameters varied by +/- 20%, or based on plausible range data provided in the literature.¹¹

Figure 1. Model structure



Model Assumptions

- The model assumes a permanent functional status after 90 days based on published literature.^{10,11}
- Long-term cost multipliers and death hazard ratios are based on ischemic stroke model¹¹ (Table 1). The model assumes that long-term costs and outcomes are based on functional status as defined by mRS.

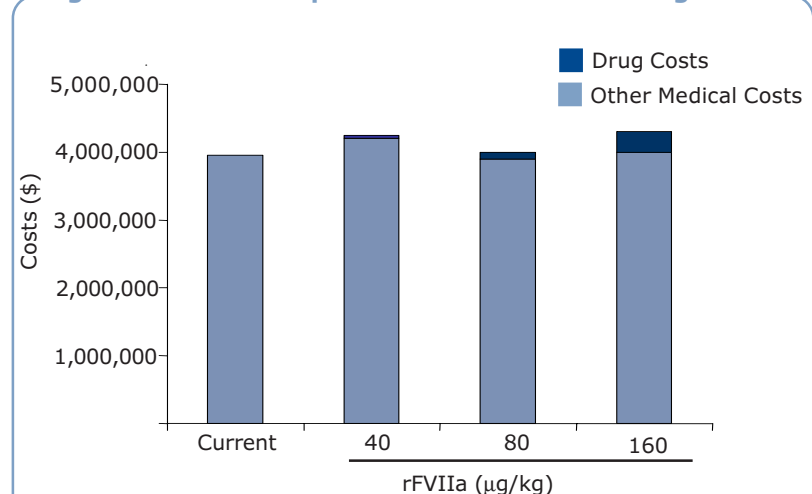
Table 1. Ranges for Cost Multipliers and Death Hazard

90-Day Functional Status	Cost Multipliers (Plausible Range)	Death Hazard Ratios (Plausible Range)
mRS 0	1(-)	1 (1.0-1.5)
mRS 1	1(-)	1 (1.0-1.5)
mRS 2	1.27 (1.04-1.70)	1.11 (1.0-1.5)
mRS 3	1.94 (1.30-2.50)	1.27 (1.2-1.4)
mRS 4	3.98 (1.70-7.00)	1.71 (1.3-2.0)
mRS 5	6.01 (2.05-10.00)	2.37 (1.5-4.0)

Results

- Base-case results presented in Figures 2 and 3.

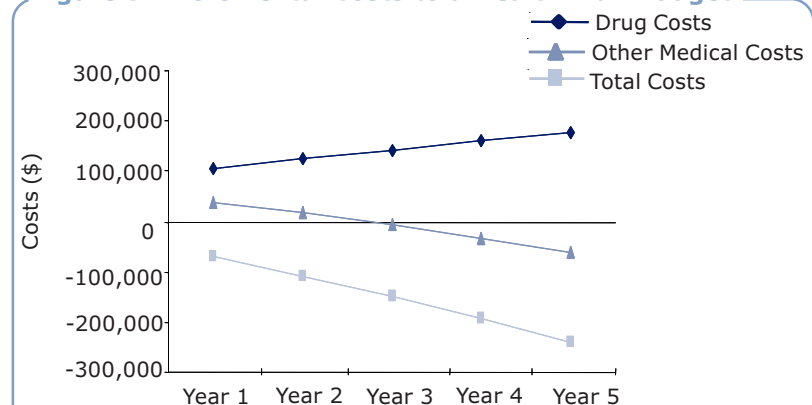
Figure 2. Annual Impact to a Health Plan's Budget



Annual Impact to a Health Plan's Budget One-Year after Introduction of rFVIIa. Figure 2 illustrates the total (drug and other medical) one-year costs associated with the introduction of 40, 80, or 160 µg/kg rFVIIa. The model assumes a 30% initial uptake of rFVIIa, and an average patient weight of 70kg.

- Expected per member per month (PMPM) costs were calculated for each treatment arm. Introduction of 80 µg/kg rFVIIa resulted in minimal increase in health plan costs (\$0.003 PMPM).
- PMPM costs varied between \$0.003 and \$0.023, depending on dose of rFVIIa used.
- Drug costs are minimal compared to other medical costs.

Figure 3. Incremental Costs to a Health Plan Budget



Incremental Costs to a Health Plan Budget with Increasing Uptake of 80 µg/kg rFVIIa over Years 1 through 5. The chart above illustrates the expected incremental costs for rFVIIa, other medical, and total costs, following the introduction of rFVIIa, assuming a 30% uptake in the first year and a 5% absolute increase in uptake of rFVIIa each year thereafter.

- Introduction of rFVIIa 80µg/kg resulted in an expected reduction in total costs by year 3 (Figure 3).
- Results are robust to realistic parameter variation.
- Model is most sensitive to the following parameters: initial hospital length of stay, 90-day functional outcome, and cost multipliers.
- Incremental PMPM total costs did not exceed \$0.02 for rFVIIa 80 µg/kg dose.

Conclusions

- Treatment with rFVIIa improves survival and functional outcome compared to standard care.
- Impact on health plan budget is modest at best in first year after introduction of rFVIIa.
- Within 3 years, introduction of rFVIIa may result in a reduction in total health plan costs.

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