Economic Evaluation of NT-proBNP Supported Guideline-Directed Medical Therapy in Discharged Patients with Heart Failure in China

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BACKGROUND

- Heart failure (HF) is a significant public health challenge in China, with a prevalence of 15 million patients, accounting for about 1/4 of the global total[1].
- Acute HF is particularly prevalent and costly, leading to high rates of readmission (32.4%) [2] and mortality (13.7%) [3] within one year post-discharge.
- Chinese HF patients have limited follow-up and suboptimal use of guideline-directed medical therapy (GDMT) after discharge[4].
- The STRONG-HF trial demonstrated that intensified follow-up visits with monitored N-terminal pro-B-type natriuretic peptide (NT-proBNP) concentrations, guiding rapid up-titration of medications, reduced all cause death or HF readmission by 34% within 180 days[5].
- Chinese clinical guidelines have recommended intensified follow-up visits and high-intensity care for HF patients after discharge based on the STRONG-HF study[6]. However, the economic impact of NT-proBNP-supported GDMT remains unknown, necessitating further evaluation.

OBJECTIVE

- To evaluate the extent to which the higher costs associated with up-titration of HF GDMT can be offset by the avoidance of HF readmissions within 180 days after discharge.

METHODS

- This study builds upon the STRONG-HF study and employs a research methodology grounded in the Expert Consensus on Pharmacoeconomic Evaluations Alongside Clinical Trials (2024 edition) to construct the analysis[7].
- A cost analysis was performed using a within-trial analysis and a decision-tree model to compare total medical costs of high-intensity care versus usual care in HF patients after discharge within 180 days(Figure.1).
- High-intensity care included five follow-up visits at 1, 2, 3, and 6 weeks, and again at 90 after discharge. These visits closely monitored clinical status, lab testing, and NT-proBNP levels. Usual care included follow-up visits only at 90 days post-discharge.
- Clinical event rates and health resource utilization data, as well as treatment effects, aligned with the STRONG-HF study.
- Cost inputs, including NT-proBNP and other laboratory testing costs, physician visit costs, drug costs, and HF readmission costs, were derived from published literature or local public databases in China (Table 1).
- Robustness of the results were assessed through deterministic sensitivity analyses (DSA).

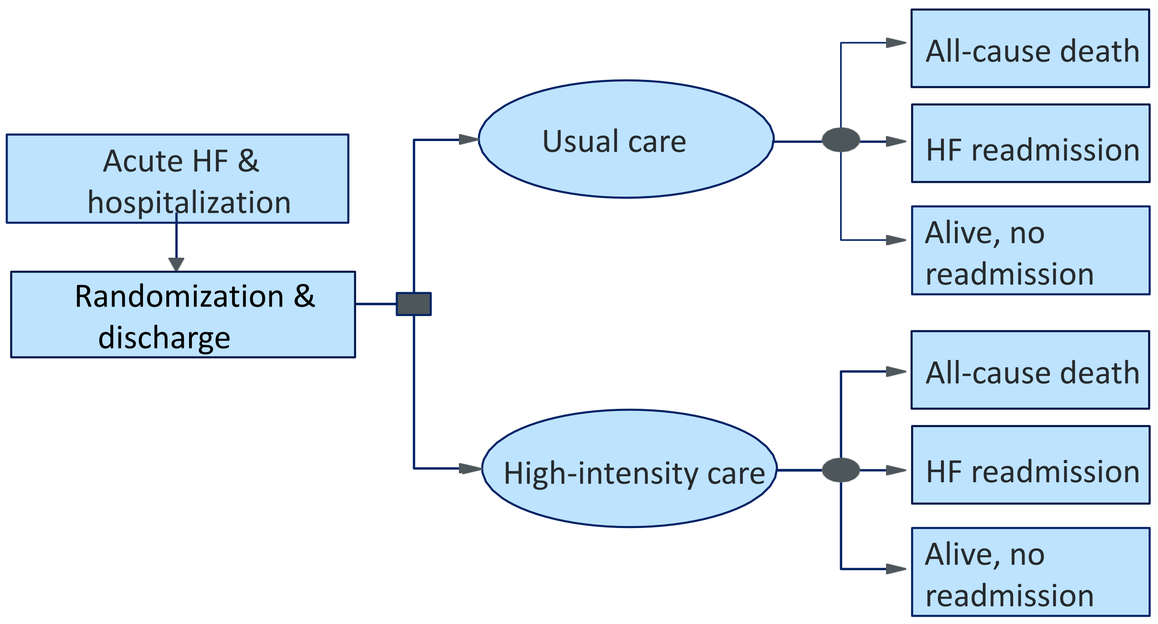

Figure.1 Decision tree

Table.1 Cost inputs

Cost Category		Unit cost (CNY)
NT-proBNP testing cost		¥150.0
Other lab testing cost		¥219.5
Physician visit cost		¥16.0
Average daily drug cost	MRA	¥1.2
	ARNi	¥9.5
	SGLT-2 inhibitors	¥3.8
Average cost per HF hospitalization		¥29,745.9

Key Assumptions

- The study population, usual care provided to patients, local implementation of high-intensity care, and treatment effects observed in the STRONG-HF study are relevant to China.
- The cost of hospitalization due to the initial acute HF event was not considered, as these costs would be identical for both groups.
- Patients were assumed to receive either 0%, 50%, 75%, or 100% of the full optimal doses, in alignment with the dose level categorization used in the STRONG-HF study.
- Other laboratory testing included blood routine, urine routine, electrolytes, liver function, kidney function, and estimated glomerular filtration rate (eGFR) testing.

RESULTS

- Compared with usual care, high-intensity care of GDMT reduced all-cause death or HF readmission by 34.8% from 23.3% to 15.2% after discharge within 180 days.
- High-intensity care decreased total medical cost per capita by 9.7%(599.8 CNY) from 6,187.6 CNY to 5,587.8 CNY as well. Despite the increased costs associated with lab testing (1,445.3CNY) and medication (152.7CNY) for high-intensity care, these were offset by the decreased readmission cost of 2,260.7 CNY (Table 2).

Table.2 Base case results

Cost Category	Usual care	High-intensity care	Difference
Lab testing cost* (¥)	362.9	1,808.3	+1,445.3
Drug cost (¥)	722.3	875.0	+152.7
Readmission cost(¥)	5,086.6	2,825.9	-2260.7
Total medical cost(¥)	6,187.6	5,587.8	-599.8

*include NT-proBNP and other lab testing cost

Sensitivity analyses

- One-way sensitivity analysis via changing every inputs by ranging from 20% to 10% showed that the HF readmission rate of usual care had the greatest impact on the results followed by HF hospitalization cost.

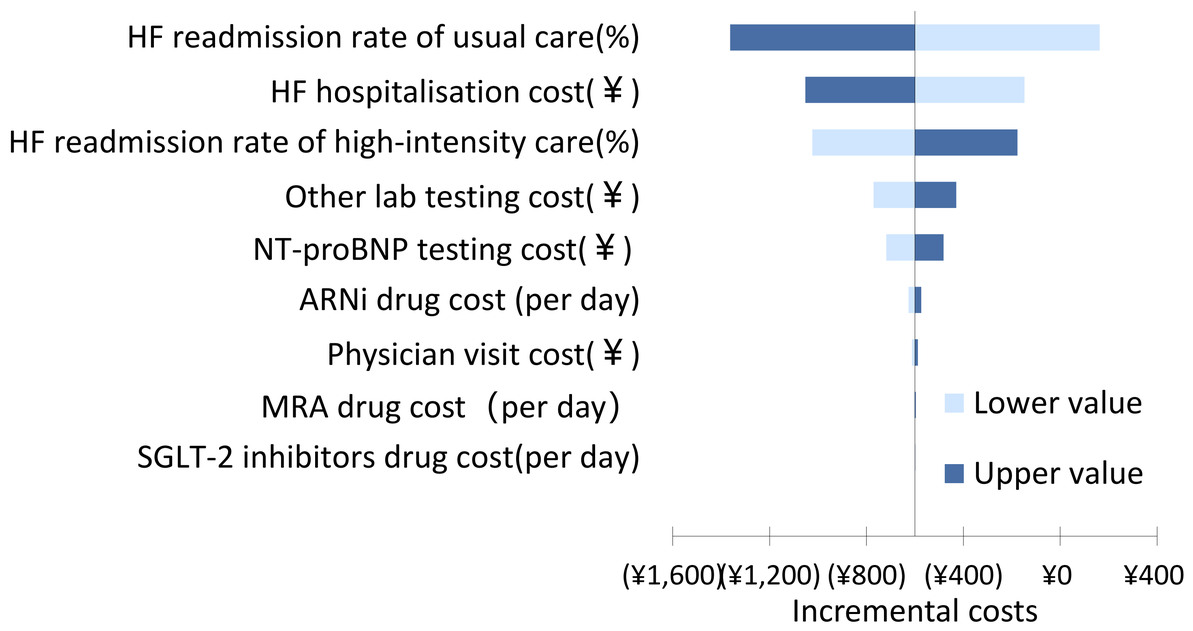

Figure.2 One-way sensitivity analysis

CONCLUSIONS

- NT-proBNP supported GDMT not only improves health outcomes but offers significant cost savings, demonstrating dominant economic advantage in acute HF patients after discharge in China.

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