

# The Annual Economic Burden of PFO-related Cryptogenic Stroke in the US: a Cost-of-Illness Study

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## Introduction

Stroke, claiming 3.3 million lives annually and resulting in the loss of 143 million disability-adjusted life-years globally, stands as the second most common cause of death and the third leading contributor to death and disability worldwide<sup>1,2</sup>. In the U.S., 692,000 cases of ischemic stroke occur annually, with 25%–40% classified as cryptogenic strokes and 40%–50% of these exhibiting patent foramen ovale (PFO)<sup>2,3,4</sup>.

## Objectives

This study aimed to evaluate the annual economic burden of PFO-related cryptogenic stroke in the U.S.

## Methods

A cost-of-illness study was performed, encompassing the direct and indirect costs of PFO-associated cryptogenic stroke on both society and the health care system. The model adopted a one-year time horizon to incorporate PFO-related cryptogenic stroke incidence into the costs associated with stroke in the U.S., with both a societal and a payer perspective.

## Results

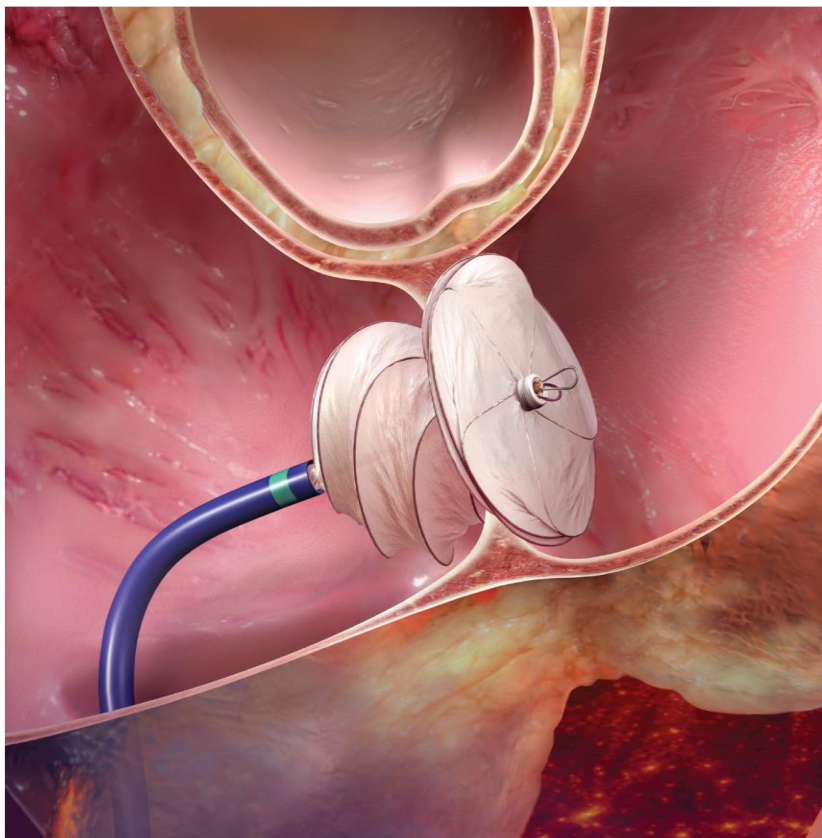
The societal model, assuming 32.5% cryptogenic strokes, incurs an annual cost of \$2,190,950,335 in the U.S., with \$1,681,106,547 coming from new strokes and \$509,843,789 from recurrent strokes. The majority of costs are attributed to indirect costs, accounting for 50% from productivity losses due to premature death and 27% from other productivity losses. Direct costs constitute 23% of the total. From the payer perspective, the annual costs for PFO-related cryptogenic strokes in the U.S. were estimated at \$504,244,294, with hospitalization costs comprising 44%, followed by prescriptions and outpatient care at 19% and 16%, respectively.

## Conclusion

The economic burden of PFO-related cryptogenic strokes in the U.S. is substantial, exceeding \$2.1 billion per year. PFO occluders play a central role alongside medical management in the prevention of recurrent PFO-related cryptogenic stroke leading to gains in both costs and health outcomes. Further research will be required to quantify these possible gains accurately.

## Background

A cost-of-illness study was conducted to quantify the burden of PFO-related cryptogenic strokes to increase awareness about the health and economic value of diagnosing and treating PFOs.



PFO closure devices **prevent recurrent strokes<sup>5</sup>**, increasing **health outcomes** and **improving the economic burden** of PFO-related cryptogenic strokes<sup>6</sup>.

- 1

Stroke is a significant global health burden

7.6 million

Global number of individuals affected by ischemic stroke each year

In the United States, approximately 692,000 cases of ischemic stroke occur each year
- 2

Resulting in severe loss of life

3.3 million

The global number of stroke-related deaths

This corresponds to a loss of 143 million disability-adjusted life-years (DALYs)
- 3

The underlying pathology is often missed

25% – 40%

Ischemic strokes are classified as cryptogenic strokes

In individuals with cryptogenic stroke, the cause of the stroke is not identified
- 4

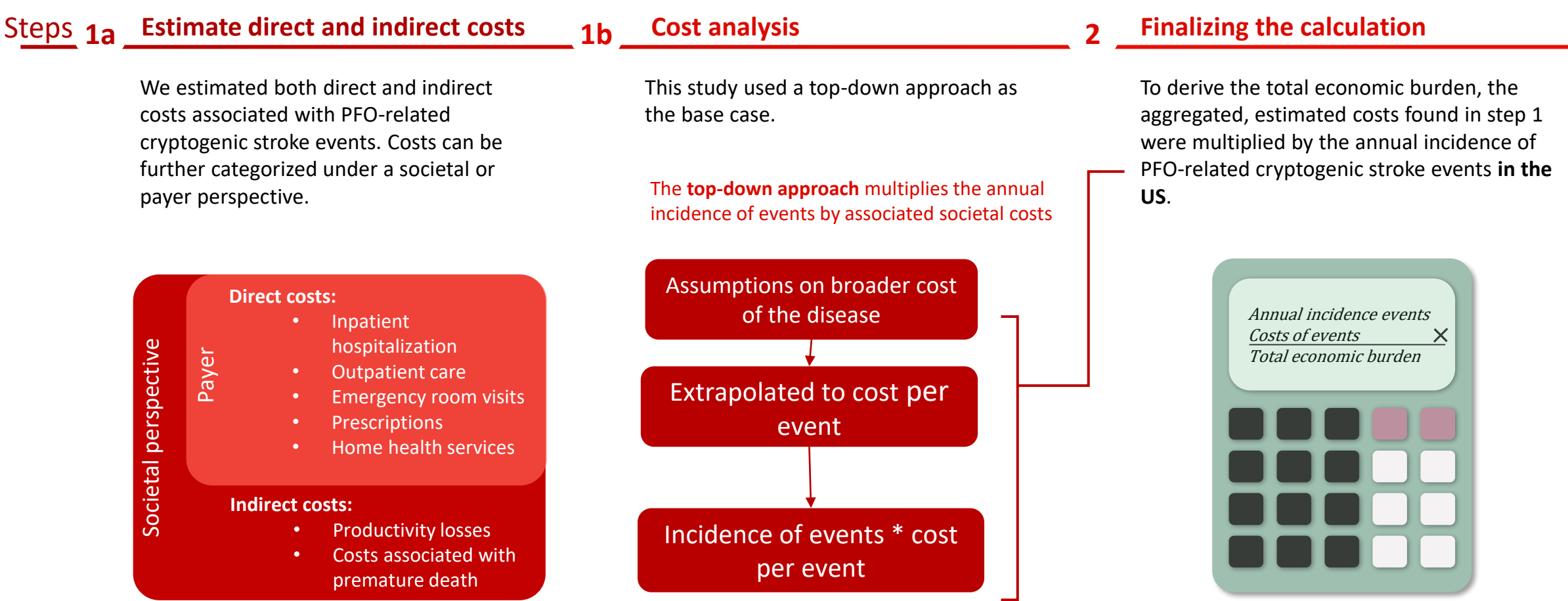
Can be identified as PFO, and thus, preventable

40% – 50%

Patients who suffered of cryptogenic strokes have PFO, especially young adults

Those strokes may have been prevented, had PFO been detected earlier

## Methods & Inputs



### Epidemiological Inputs and Calculations

Parameter	Input	Source
Annual incidence of new stroke	610,000	Tsao CW, et al., 2023 <sup>2</sup>
Annual incidence of recurrent stroke	185,000	Tsao CW, et al., 2023 <sup>2</sup>
Prevalence of ischemic stroke	87%	Tsao CW, et al., 2023 <sup>2</sup>
Annual incidence of new and recurrent ischemic stroke	691,650	Calculation based on input data
Prevalence of cryptogenic stroke	33%	Saini V, et al., 2021 <sup>3</sup>
Prevalence of PFO in cryptogenic stroke	41%	Koutroulou et al., 2020 <sup>4</sup>
Annual incidence of new PFO-associated cryptogenic stroke	71,130	Calculation based on input data
Annual incidence of recurrent PFO-associated cryptogenic stroke	21,572	Calculation based on input data
Mortality following ischemic stroke	4.1%	OECD iLibrary, 2021 <sup>7</sup>
Annual premature deaths associated with new PFO-associated cryptogenic stroke	2,916	Calculation based on input data
Annual premature deaths associated with recurrent PFO-associated cryptogenic stroke	884	Calculation based on input data

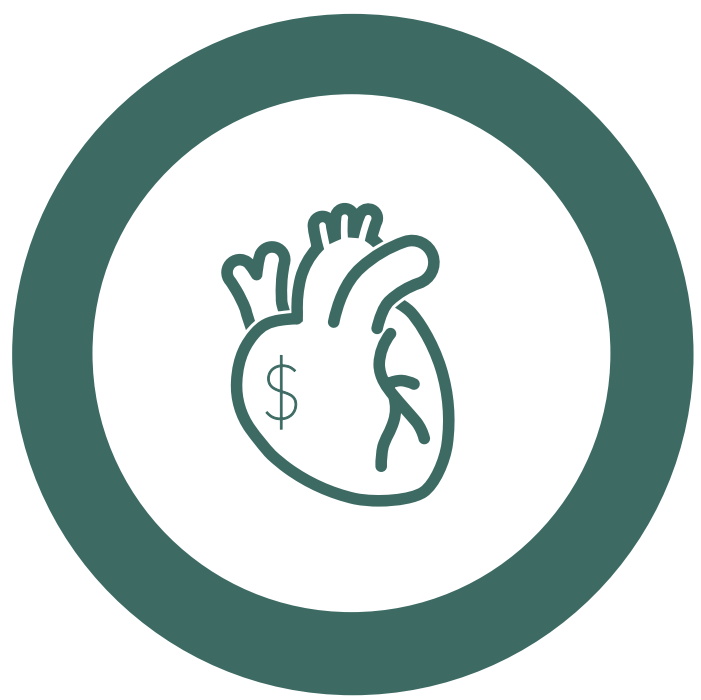
## Findings

- 1

PFO-related strokes incur a significant economic burden
- 2

Recurrent strokes account for a large fraction of the costs
- 3

Hospitalizations are the main contributor to direct costs



\$2.2 billion

The annual costs for PFO-related cryptogenic strokes in the US were estimated to exceed \$2.2 billion, of which \$1.6 constitutes societal costs.



\$0.5 billion

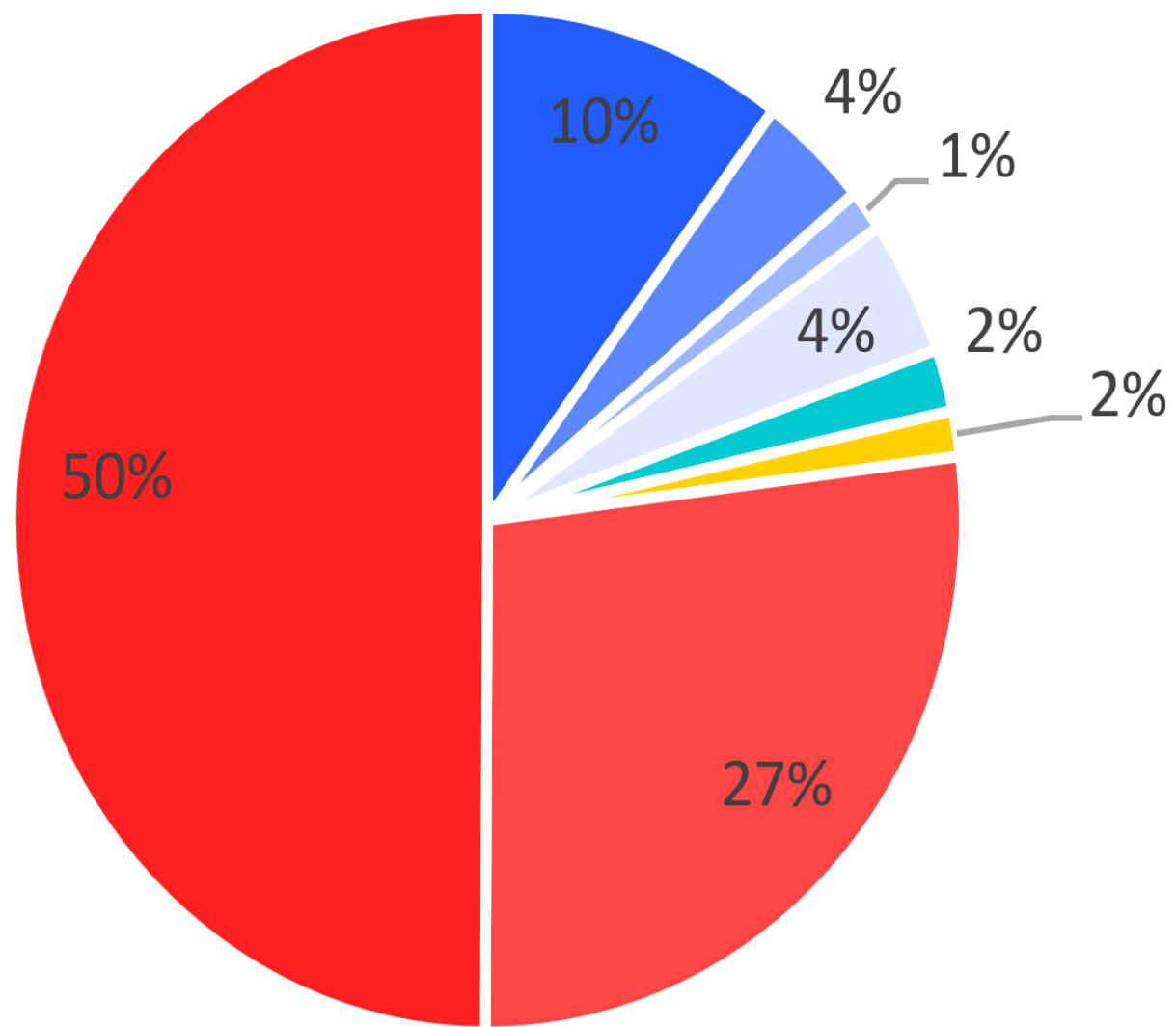
The annual costs linked to recurrent stroke were estimated to be more than \$0.5 billion and those for new strokes nearly \$1.7 billion.



44%

Hospitalizations are the largest contributors to PFO-related stroke expenditures (44%), followed by prescriptions (19%) and outpatient care (16%).

Annual costs of new and recurrent PFO-related cryptogenic stroke in the United States, by cost category (societal perspective)



- Inpatient hospitalization
- Outpatient care
- Emergency room visits
- Prescriptions
- Home health services
- Other direct costs
- Productivity loss
- Premature death

### References:

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