Global Trends in Thrombectomy Device and Systems Development: Retrospective Review between 2000-2022

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PURPOSE

Conventional thrombectomy procedures involve surgical incisions to access the blood vessels, but endovascular thrombectomy has become a more common and less invasive method. Endovascular thrombectomy involves accessing the blood vessels through a small puncture in the skin, typically in the groin, and then threading a catheter through the blood vessels to the location of the clot.

In recent years, advancements in technology have led to the development of novel endovascular thrombectomy techniques and devices. These new technologies have the potential to improve outcomes for high-risk or critically-ill patients. There are different types of thrombectomy devices, such as manual aspiration devices, mechanical thrombectomy devices, and stent retrievers. Each of these devices has unique features that make them suitable for different types of clots and patient conditions.

The purpose of our study is to:

- **Examine global trends in thrombectomy device and systems development between 2000-2022.**

METHODS

- Global databases were accessed to compile a list of thrombectomy devices and systems submitted for regulatory approval by respective institutions and companies.
- Database query was between 01/01/2000 to 09/01/2022.
- Regulatory dossiers were examined, from which additional information including: Country of origin, Product territory, Indications for use, Device mechanism of action, Stage of development

RESULTS

Indication	# Devices	% Total
Neurovascular	93	58.30%
General Thrombosis	40	24.80%
Pulmonary Embolism	15	9.30%

Table 1. Distribution of thrombectomy device development.

- Neurovascular indications accounted for the majority of indications for thrombectomy devices.

Table 2. Distribution of thrombectomy devices by stage of development

- Majority in clinical application
- A significant number of devices are still in development and approval stages, highlighting the ongoing need for research and development in this field to continue to improve outcomes for high-risk or critically-ill patients.

Stage	# Devices	% Total
Product Development	31	19.30%
Preclinical	4	2.50%
Approval Process	10	6.20%
Clinical Application	88	54.70%
Discontinued	1	0.60%
Inactive or Indeterminate	27	16.10%

Device Mechanism	# Devices	% Total
Stent-Retriever	47	29.2%
Aspiration, Manual Aspiration or Thrombectomy Systems	114	70.8%

Table 3. Distribution of thrombectomy devices by mechanism of action.

- Different MOAs are indicated for different clinical scenarios.
- Aspiration thrombectomy MOAs are predominant MOA of devices avaialble.

DISCUSSION

- The study found that the United States, China, and Japan are the leading countries in thrombectomy device and systems development.
- This is likely due to their strong healthcare infrastructure and presence of leading medical device companies.
- The high number of devices in developmental pipeline in these countries suggests continued investment in healthcare infrastructure and R&D.
- These results imply that:
  - The **US** companies have more opportunities to develop and market devices domestically and internationally.
  - US regulatory agencies are more favorable for approval of thrombectomy devices.
  - **China** is becoming a major player in the thrombectomy device industry, which could lead to more competition in the market and more options for patients.
  - **Japan** has strong healthcare infrastructure and well-established medical device industry focused on developing innovative thrombectomy devices.

FUTURE DIRECTIONS

- Further research on the long-term outcomes of patients treated with different types of thrombectomy devices could provide valuable information on the effectiveness of these devices and guide future R&D and commercialization.

REFERENCES

- "U.S. Food and Drug Administration. (n.d.). Medical Devices. Retrieved [insert date], from https://www.fda.gov/medical-devices"

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