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Clinical Unmet Needs for Repetitive Transcranial Magnetic Stimulation and Integrated Neuro-navigation System in Patients with Stroke, Nationwide survey

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Background

- Repetitive Transcranial Magnetic Stimulation (rTMS) has gained significant interest as a therapeutic intervention for stroke rehabilitation.
- Despite its potential, significant unmet needs exist in clinical application due to heterogenous protocols across studies, variability in therapeutic outcomes, and challenges in device operation.
- This study aims to identify clinical unmet needs in rTMS and integrated neuro-navigation systems in patients with stroke.

Methods

- A survey was administered across 74 rehabilitation facilities (1,129 physiatrist) including tertiary hospitals, authorized restorative rehabilitation hospitals, other rehabilitation hospitals in nationwide.
- The questionnaire consists of various domains, including perspective, current utilization in clinical practice, and unmet needs for rTMS and neuro-navigation systems.
- Data was obtained via e-mail and postal services using Google Forms.

Results

- 122 finally responded to survey, and about 70% of respondents currently applying rTMS for post-stroke rehabilitation.
- Most respondents apply rTMS for motor impairment (100%), following by language dysfunction (69.4%) , and cognitive impairment (30.6%).
- Of those, 37.7% have a treatment protocol but are unfamiliar with it, while 6.6% have no protocol at all.
- Unmet needs for rTMS are lack of treatment protocols, guidelines, education, followed by usability of device, lack of evidence of clinical effect, insurance policy.

Discussion & Conclusions

- There is a considerable clinical unmet needs in rTMS and integrated neuro-navigation system for stroke rehabilitation.
- The establishment of standardized protocols and guidelines, coupled with the availability of accessible neuro-navigation systems, is imperative for enhancing the clinical efficacy and efficiency of rTMS.

Figure 1. Experience of rTMS for treatment of patients with stroke

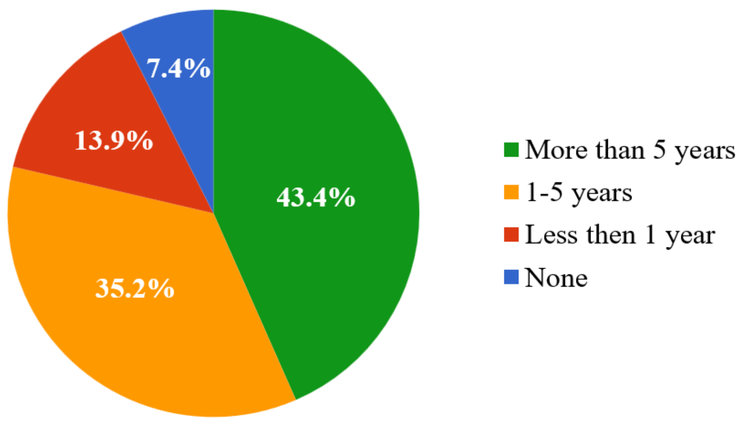


Figure 2. Effectiveness of rTMS in patients with stroke

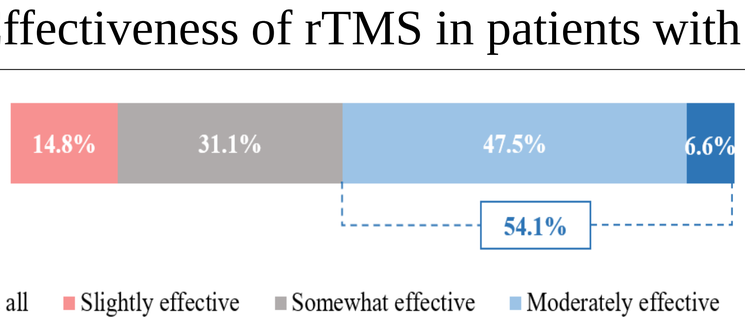


Figure 3. Physician awareness of rTMS in patients with stroke

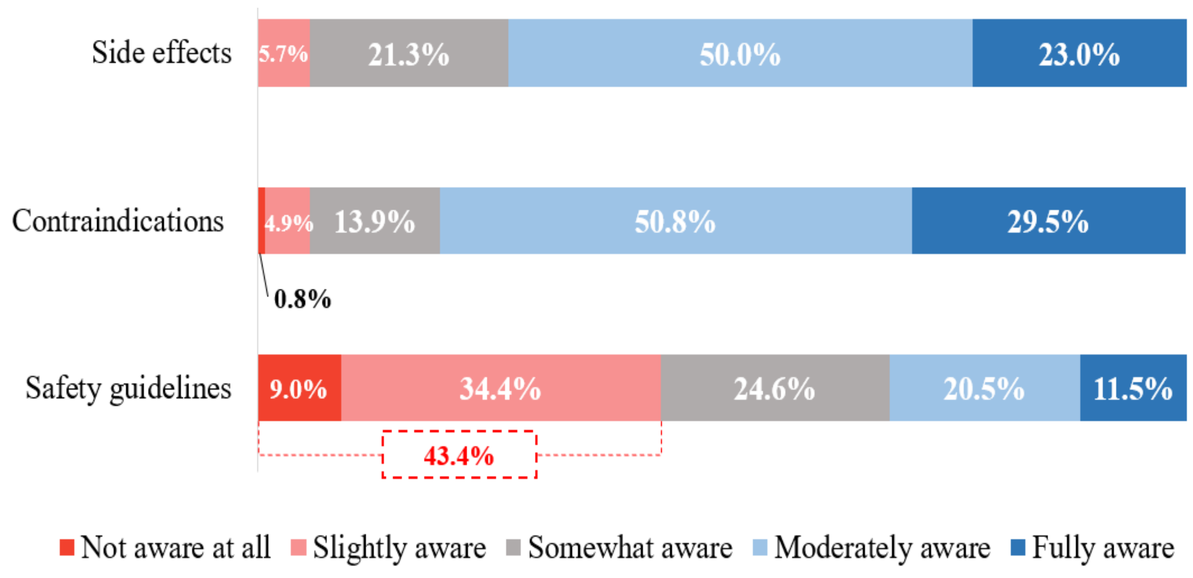
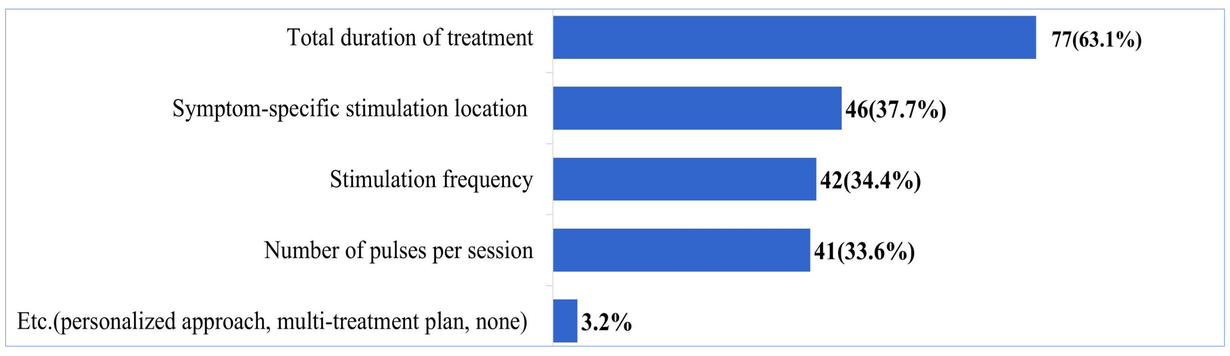
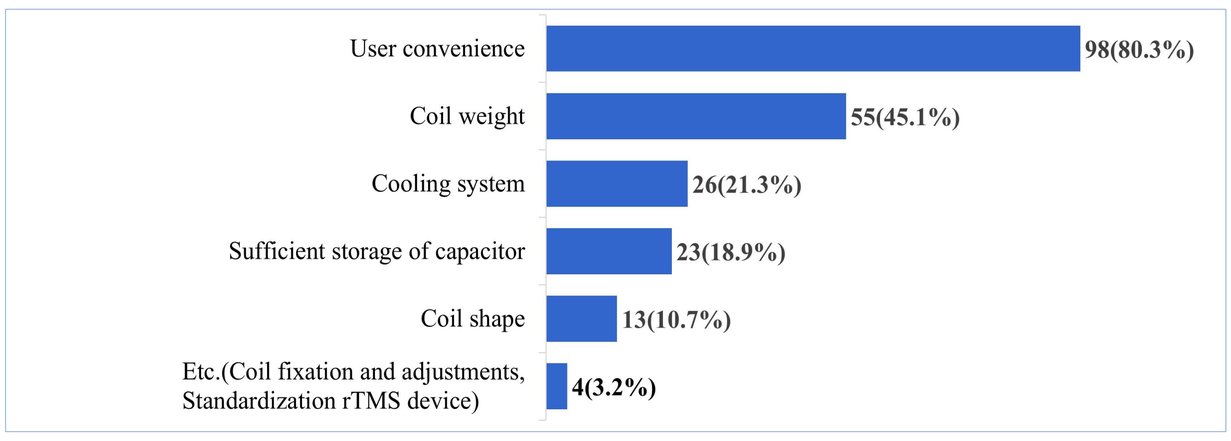


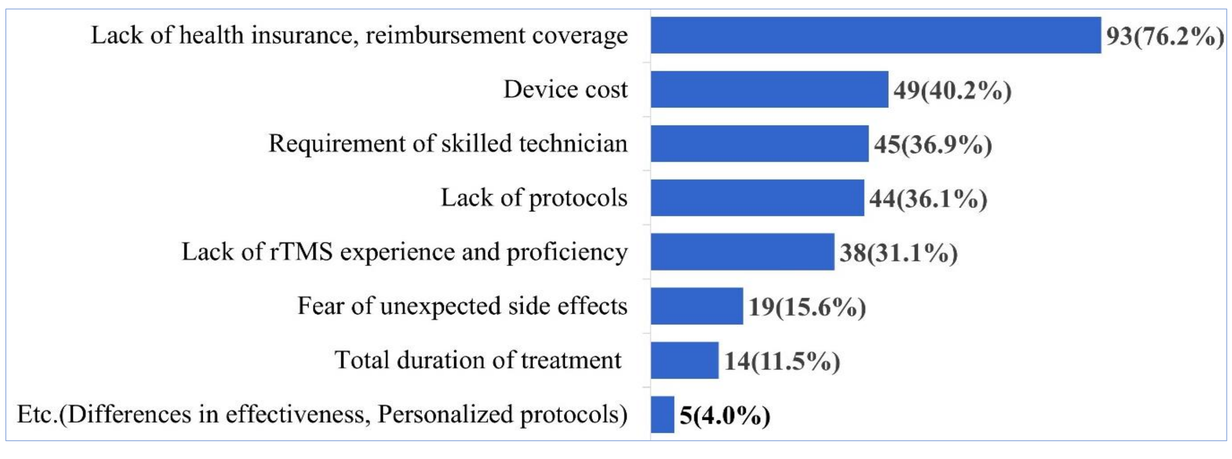
Figure 4. Unmet needs for rTMS therapy in patient with stroke



(A) Unmet needs for **treatment protocol**



(B) Unmet needs for **rTMS device**



(C) Barriers to clinical application

Table 1. Clinical implementation of rTMS in patient with stroke

Item	Answer	Total(n=85)
How do you determine the motor threshold?	Measurement of motor evoked potentials	49(57.6)
	Visual observation of muscle twitch	30(35.3)
	Not identifying motor threshold	6(7.1)
How do you determine the motor hot spot?	Measurement of motor evoked potentials	46(54.1)
	C3/C4 in the standard 10-20 system (EEG)	36(42.4)
	Not identifying motor hot spot	2(2.4)
What method do you apply to keep the coil in the initial stimulation target?	Fix the coil with an extra arm (O) adjust the coil along with the patient's movement (O)	49(57.6)
	Fix the coil with an extra arm and (O) adjust the coil along with the patient's movement (X)	20(23.5)
	Hold the coil manually (O) adjust the coil along with the patient's movement (O)	14(16.5)
	Hold the coil manually (O) adjust the coil along with the patient's movement (X)	2(2.4)

All data presented with n(%)

Figure 5. Usage and needs for neuro-navigation system in rTMS

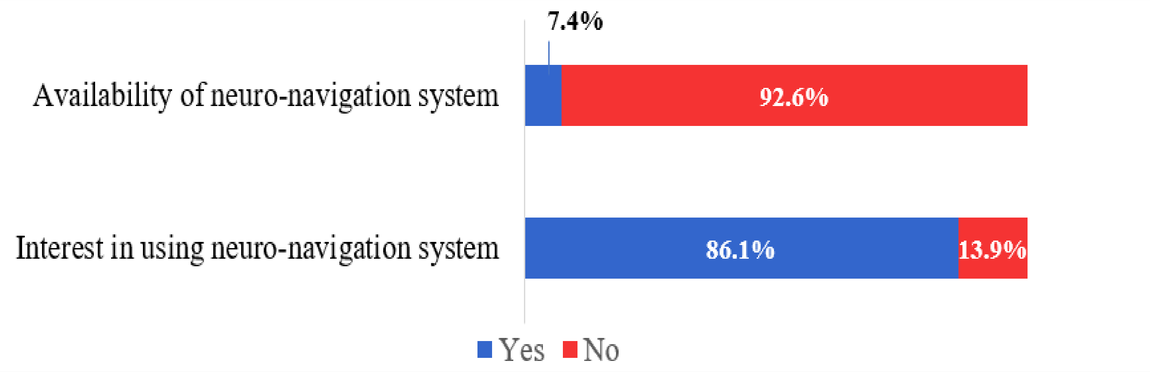
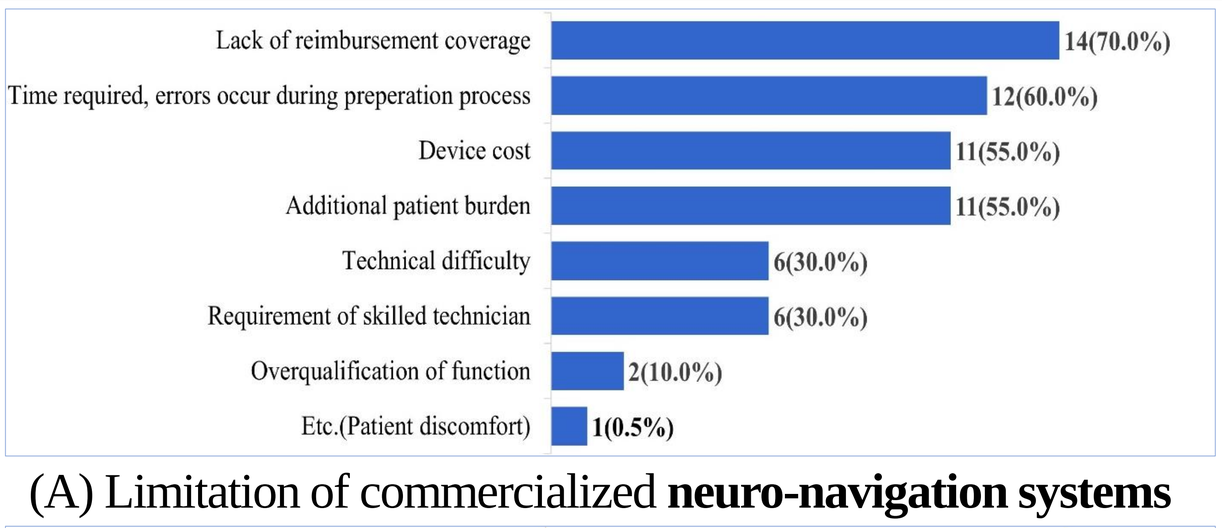
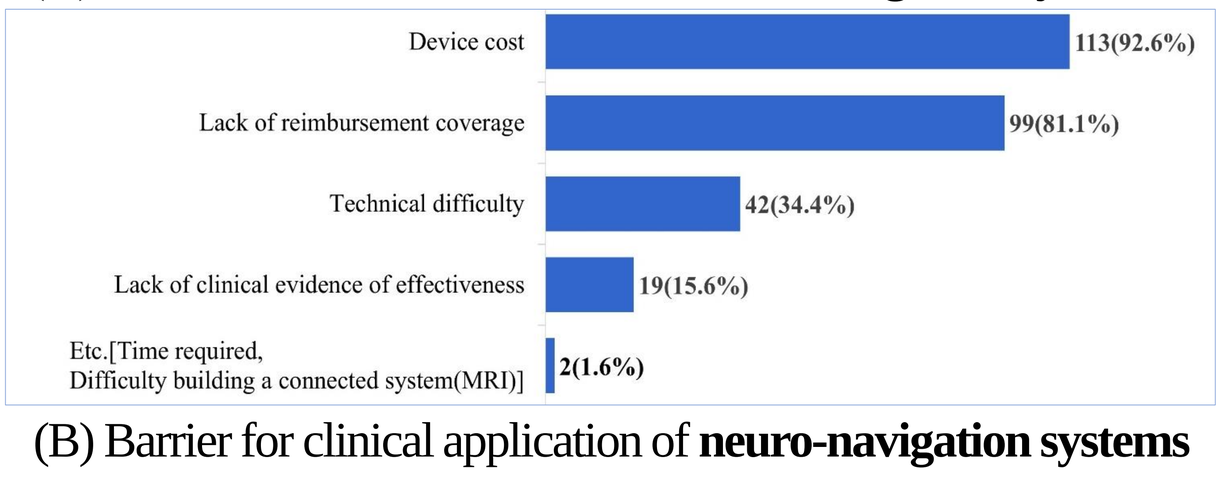


Figure 6. Unmet needs for neuro-navigation system for rTMS



(A) Limitation of commercialized **neuro-navigation systems**



(B) Barrier for clinical application of **neuro-navigation systems**

Supplement 1. Questionnaire

Supplement 2. Survey Result

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