

Physician Perspectives on Closed-Loop Neuromodulation in Epilepsy Care

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Background

Responsive neurostimulation (RNS) has been commercially available for refractory epilepsy since 2013, providing both patients and clinicians with clinical experience of closed-loop stimulation.

In this study, we sought insight into clinicians' experiences with the RNS device, including their views on the social and ethical implications of this still novel technology.

Methods

Study cohort

We interviewed 8 epileptologists from Level 4 epilepsy centers across the United States. Participants were recruited by referral from an epileptologist at the primary study site.

Data collection

We conducted a single, open-ended, semi-structured interview lasting approximately 1-hour with each participant.

Data analysis

We audio recorded and transcribed each interview, and imported transcripts into ATLAS.ti software for analysis. Preliminary analysis yielded four topics of interests that we are continuing to explore through comprehensive coding methods.

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Clinician Relationships with Industry

Clinicians had differing interactions with industry field engineers and varied perspectives on best practices for long-term collaboration.

3105: "So they'll review it in advance of the clinic. And help optimize detection paradigms. And then by the time that we have the clinic, we have a chance to look at what the [field engineer] looked at before. And then we program it together. **It's pretty difficult to program the device independently.** I don't think there are too many - I don't know. I don't want to speak for other centers. But I don't think there are too many physicians that do it entirely independently."

3106: "**I would say 80 percent of the time the last couple of years they are rarely here.** But I find them extremely useful, though. And I think no matter how much we understand epilepsy, if someone does not have truly an engineering background, I think it's always good to have them."

Clinical Expertise and Electrical Data

The RNS device produced a new quantitative view of epilepsy, which clinicians had to integrate with their own expertise.

3101: "We're not going to treat every single change on electrical line. At the end of the day, it's a clinical decision. **We're not treating lines or numbers. We're treating an actual person.**"

3103: "... I've done it enough to where when I go in to see the patient for that hour, that I can assess the situation, I can look at the ECoGs and come up with a plan. Maybe 20% of the time I will do what [the field engineers] suggested and 80% of the time I'm going to do a variation on it, occasionally doing the complete opposite of what they've said because I – not to be contrarian, but **I'm basing it on the clinical scenario which is the information they don't have.**"

3105: "**Patients are notoriously bad at assessing how many seizures they're having, for a variety of reasons.** They might now know if they've had a seizure, or they might forget. They might not write it down. They might not want to tell you. There are a lot of reasons why that can affect how accurate the report is. So, I definitely look at both clinical and electrical data. **It's always interesting to try to corroborate...**"

Device Eligibility and Access

The RNS device's capabilities influenced clinicians' evaluation of patient eligibility, which could ultimately hinder access for some underserved populations.

3101: "**The main problem comes if a patient is homeless, is they need access to internet to download the data.** So, if a person doesn't have a stable place where they can go to every night and plug in the data and download it ... And if they're homeless and they're carrying this laptop ... I personally think everybody should have access to this. But we also want to make sure we don't put them at a bigger risk... **Or some of our epilepsy patients can't drive... he has to depend on public transport, which is really bad here...** that adds another issue."

3106: "This device, obviously, you need to have internet access. You have to download the data. Most of these patients are young. They have at least completed high school or some college. **It feels as if I'm biased even selecting patients.** Because if I see a patient who does not have those things, subconsciously I may sway against using the RNS app, to be honest with you."

Clinician-Patient Communication

Clinicians noted how the RNS device produced new discussions with patients about expectations and responsibilities.

3102: "The patients feel a sense of safety in my opinion. They know I know their story, I know their brains. They even asked me, how often do you log in, just last week. And – I want to be careful, and think, oh, my goodness, **maybe I'm not logging in enough because they want to hear you're logging in every day,** which I'm not."

3103: "Every change I make, I can't predict what is going to happen. I can give you an educated guess, I can give you an educated estimate, I can tell you what other similar people have done, but I can't guarantee that what I do is going to work. So, it's a fluid situation. We're going to act, then if necessary we're going to react, and that's going to require us working together. **And I think the patients of mine who have bought into this notion of going the RNS route like that idea, that we're a team.** They're a contributory – they're the most important part of the team."