CAPRI: Consistent Approach to Pulsed Radiofrequency Intervention

A Consensus Survey Report of 100 RF Users

INTRODUCTION

Radiofrequency (RF) is a well-established treatment option for a wide variety of chronic pain conditions. This minimally invasive percutaneous treatment uses an alternating electrical current with oscillating RF wavelengths to eliminate or alter pain signals from the targeted site.[1]

PULSED RADIOFREQUENCY (PRF)

PRF uses short pulses of RF current at intervals of longer pauses to prevent a temperature rise that could cause permanent tissue damage. The purpose of these pulses is to alter the processing of pain signals without causing structural damage to nerve fibers, unlike continuous RF procedures.[1]

A KEY LIMITATION OF PRF IS ITS INCONSISTENCY IN TREATMENT DELIVERY.[2-5]

In PRF, the generator will adjust the amount of energy delivered over the course of treatment to stay below the selected temperature limit. When the programmed time has elapsed, the total dose of energy delivered to the patient is unknown, making treatment difficult to replicate.

The existing but limited literature on PRF, predominated by case series and retrospective studies, lacks consistency and scientific integrity regarding the parameters used, making it difficult to compare studies or draw meaningful conclusions. Similarly, there is no consensus in clinical practice, which limits reproducibility.[2]

PULSED DOSE RADIOFREQUENCY (PDRF)

PDRF is an alternative to the traditional PRF technique, adjusting the current delivery mode to deliver a consistent dose of energy to each patient.[1,3]

PDRF ENSURES CONSISTENT TREATMENT DELIVERY.[1,3,4]

With PDRF, physicians prescribe the number of doses to be delivered, irrespective of the time.

At temperatures below the selected limit, the generator will administer the doses at the programmed voltage and pulse width.

Therapy is consistent between patients and can be replicated to possibly improve outcomes.

CONSENSUS SURVEY

To address the variability of applying PRF in real-world practice, Abbott conducted an online survey from March to May 2024 involving 100 RF users. The survey specifically targeted the treatment of lumbosacral radicular pain, which was utilized by 83% of respondents, and cervical radicular pain, which was utilized by 64%. Other frequently reported indications for PRF included shoulder pain (74%), inguinal pain (68%), postherpetic neuralgia (51%), knee pain (48%) and craniofacial pain (47%).

Overall, survey findings revealed significant inconsistencies in the selected parameters for PRF, including voltage, frequency, pulse width and duration of treatment. Interestingly, 80% of users indicated they had noticed less-than-ideal pain relief in patients when using PRF.

These results reinforce the need for standardization of the procedure to ensure a consistent approach to PRF treatment delivery.

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SURVEY OUTCOMES

Respondent Profile (n = 100)

- About one-third of respondents were English speakers (33%), followed by Dutch (28%) and Spanish (18%). Other languages, each representing less than 10%, included French, German, Polish, Swedish and Italian.
- Most respondents were pain specialists (47%) or anesthesiologists (43%) working in a mix of public (67%) and private (33%) hospitals.
- Experience with PRF varied; 22% had less than 5 years of experience, and 13% had more than 20 years of experience.
- 26% of users handled on average 10 or more cases per week.

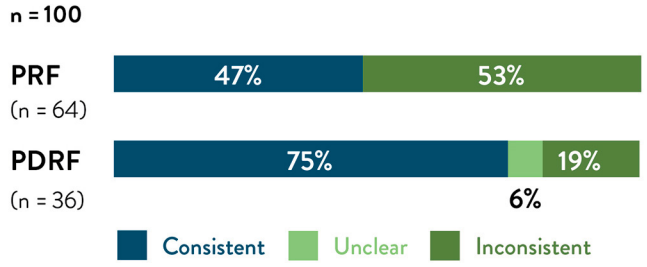
RF Materials (n = 100)

- Abbott was the most widely used generator (n = 75), followed by Boston Scientific‡ (n = 24), Avanos‡ (n = 7), Diros‡ (n = 5), Medtronic‡ (n = 2), TOP (n = 3) and Stryker‡ (n = 1).
- Cannula size ranged from 16 to 22 gauge with most respondents preferring a 20-gauge, 10-cm-long cannula with a 5 mm active tip.
- A conventional cannula was used by 86% of respondents.

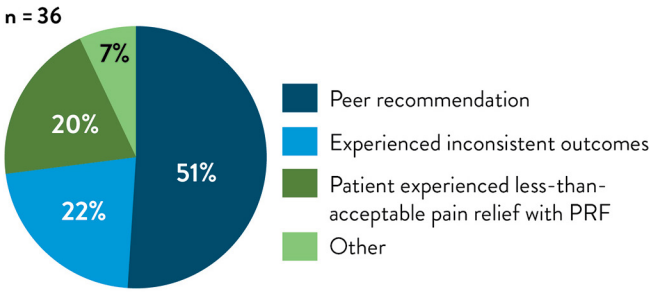
Experience With PRF or PDRF (n = 100)

- The majority of respondents (64%) had experience with PRF; 36% had experience with PDRF.
- For respondents using PRF (n = 64), half (53%) reported inconsistent outcomes and the majority (80%) experienced less-than-ideal pain relief. Of those who used PDRF (n = 36), 75% reported consistent outcomes.
- The most common reason for using PDRF (n = 36) included the desire to deliver consistent and replicable therapy to patients (n = 29/36), followed by knowing the exact amount of therapy being delivered (n = 20/36). More than half of the respondents started using PDRF based on peer recommendation (n = 21/36).

RF Outcomes



Why Did You Start Using PDRF?



Parameter Settings in Lumbosacral Radicular Pain and Cervical Radicular Pain

- All respondents agreed on the importance of providing consistent and replicable PRF therapy. With both techniques, however, there was no consensus on the optimal parameter settings, resulting in the use of variable voltages, pulse widths, frequencies and durations of treatment for each of the indications.

Outcome variability in current PRF literature is likely due to the wide range of treatment parameters used in clinical practice, resulting in variable energy delivery per patient.

Further research and clinical use of PDRF may offer the opportunity to improve PRF outcomes through consistent energy delivery and treatment replicability.

1. Ojango C, Raguso M, Fiori R, Masala S. Pulse-dose radiofrequency treatment in pain management-initial experience. *Skeletal Radiol*. 2018;47(5):609-618. doi:10.1007/s00256-017-2854-8
2. Hackworth RJ. Pulsed radio frequency. But what dose did you use? *Pain Medicine*. 2012;13(12):1662-3. doi:10.1111/j.1526-4637.2012.01525.x
3. Gauci CA, Jankowiak B. *Manual of RF Techniques: A Practical Manual of Radiofrequency Procedures in Chronic Pain Management*. 3rd ed. CoMedical; 2011.
4. Abbott. IonicRF™ Generator Clinician's Manual. 2020.
5. Boston Scientific‡. G4‡ Radiofrequency Generator Operator's Manual. 2020.

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Brief Summary: Prior to using Abbott devices, please review the Clinician's Manual for a complete listing of indications, contraindications, warnings, precautions, potential adverse events, and directions for use. The system is intended to be used with electrodes and cannulae that are compatible with the system.

Indications for Use: The IonicRF™ Generator, in combination with approved compatible electrodes and cannulae, is indicated as an aid in the management of pain in the nervous system. Examples include, but are not limited to, facet denervation, rhizotomy, and related functional neurosurgical procedures.

Contraindications: The use of this device is contraindicated in patients with systemic infection or local infection in the area of the procedure.

Warnings/Precautions: Hazardous electrical output, electric shock hazard, equipment failure, explosion hazard, fire hazard, pooling hazard, ignition hazard, risk of RF burns and unintended stimulation, risk of RF burns to patient, interference with active implants, redirection of high-frequency currents, interference with other equipment, shortwave or microwave equipment, apparent low output or failure of equipment, risk of patient injury, proper device use, non-sterile, accessories, continuity monitoring, inspection, mechanical damage, electrode positioning, use of fluids, dispersive connections, cleaning the generator, emergency stop.

Adverse Effects: Damage to surrounding tissue through iatrogenic injury; nerve injury, including thermal injury, or puncture of the spinal cord or nerve roots, potentially resulting in radiculopathy, paresis, and paralysis; pain, pulmonary embolism, hemothorax or pneumothorax, infection, unintended puncture wound, including vascular puncture and dural tear, hemorrhage, and hematoma. Clinician's Manual must be reviewed for detailed disclosure.

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