EMED Technologies

Addressing Needle Phobia in Pediatric Immunoglobulin Replacement Therapy: Behavioral Pathways and Contemporary Subcutaneous Needle Technology

Neal de Beer, Ph.D., Richard L. Wasserman, M.D., Ph.D. Paul Lambert, JonPaul Lambert, Alex Nikanorov M.D., Ph.D.

Executive Summary

Needle-related fear is common in childhood and adolescence and can jeopardize long-term adherence to subcutaneous immunoglobulin (SCIG) therapy for primary immunodeficiencies.

Practical solutions combine:

1. Early screening and stratification of needle fear;
2. Evidence-based behavioral and sensory interventions (education/coaching, distractions or virtual reality [VR], topical anesthetics, exposure-based therapy with applied tension);
3. Optimization of drug delivery devices (short, small-gauge subcutaneous (SC) needles; safety wings; automatic inserters; multi-lead sets; and pumps that enable higher flow and fewer needle sticks).

SCIG is effective, home-friendly, and associated with fewer systemic adverse events than intravenous immunoglobulin (IVIG) therapy. Choosing needle length/gauge and per-site volume/rate helps minimize pain, session time, and the number of needle sticks — key drivers of acceptability in children.

Background

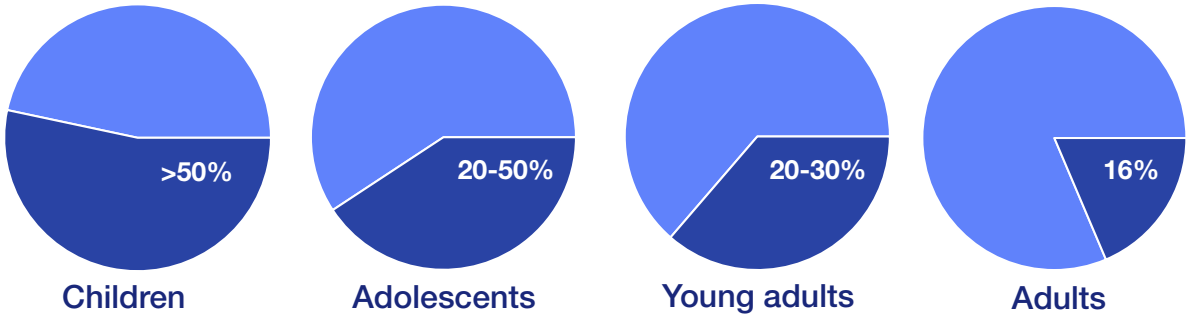
Systematic reviews report that most children exhibit needle fear[1, 2, 3], while estimates in adolescents range from ~20–50% [1], with clinically significant fear more common in females and in those with prior negative experiences[3]. Needle fear contributes to avoidance, distress, and nonadherence to treatment, and is especially problematic for therapies that require regular needle access.

Immunoglobulin replacement therapy is a multi-year or lifelong treatment for many with antibody deficiencies, that can be administered either intravenously or subcutaneously. SCIG supports home administration, stable serum IgG levels, and lower rates of systemic adverse events compared with IVIG, but success hinges on the child's and family's comfort with repeated needle insertions[11,12,13].

Across therapeutic areas, an increasing number of biologics and specialty drugs are being reformulated for SC delivery to improve patient experience, adherence, and access. SC infusion enables treatment in non-clinical settings, reducing dependence on infusion centers and lowering overall healthcare costs. Compared with intravenous administration, subcutaneous routes often allow for steady-state pharmacokinetics, fewer systemic reactions, and shorter administration times. However, successful adoption depends on the usability of the infusion system, patient confidence with self-administration, and healthcare provider support to ensure safe, consistent dosing at home.

Needle fear & phobia prevalence estimation

iDevax, Needle Phobia[10]



Evidence-based behavioral playbook for pediatric needle distress

Prepare and coach
Use developmentally honest language ("pinch" or "poke"), offer choices that grant control, and set expectations. Leverage modeling of calm behavior.

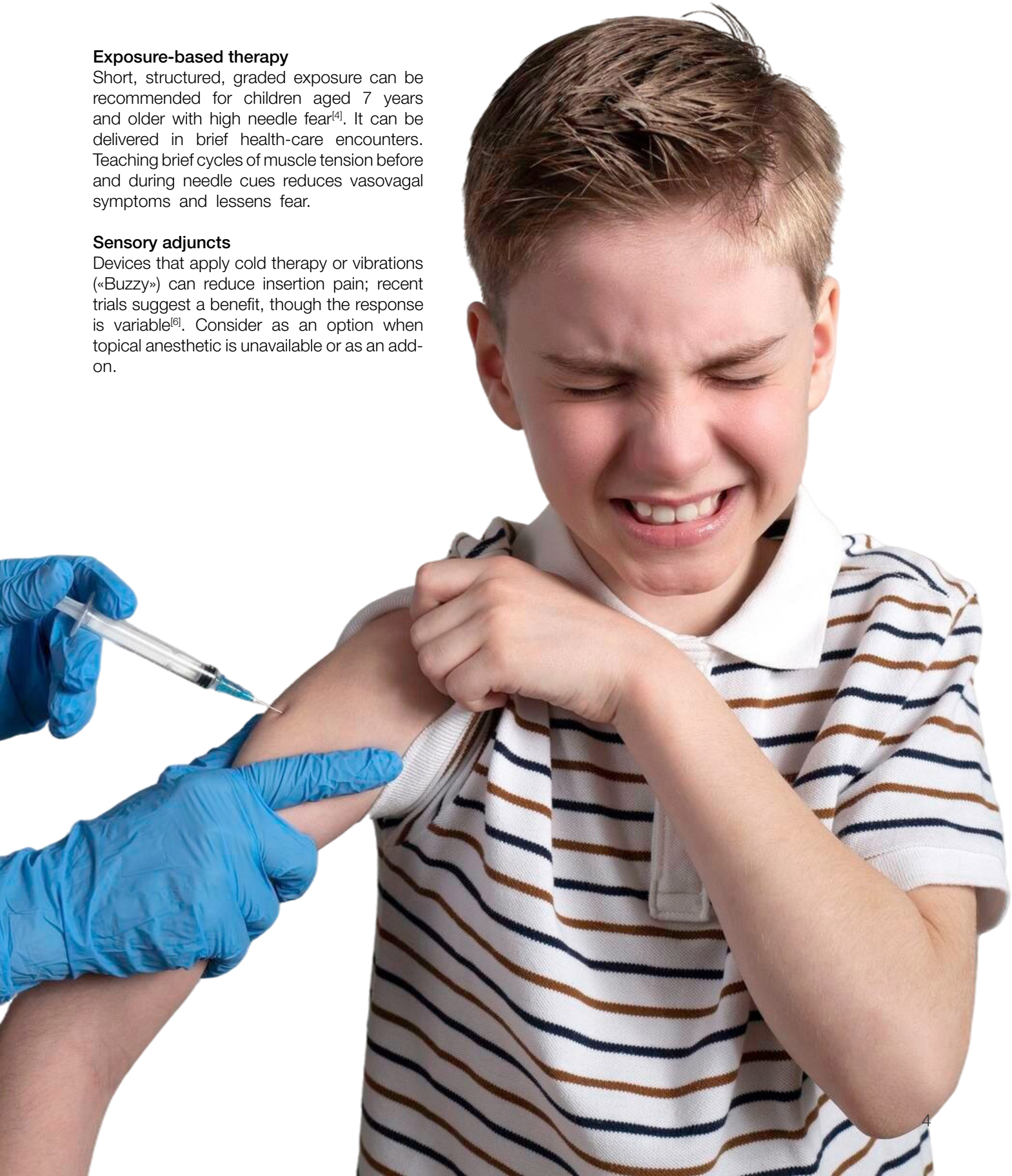
Topical anesthetics
Apply lidocaine or equivalent ahead of insertions.

Active distraction and VR
Age-appropriate distraction
- Videos
- Games
- Music
- Virtual reality[5]

Step-up strategies for moderate to high fear levels

Exposure-based therapy
Short, structured, graded exposure can be recommended for children aged 7 years and older with high needle fear[4]. It can be delivered in brief health-care encounters. Teaching brief cycles of muscle tension before and during needle cues reduces vasovagal symptoms and lessens fear.

Sensory adjuncts
Devices that apply cold therapy or vibrations («Buzzy») can reduce insertion pain; recent trials suggest a benefit, though the response is variable[6]. Consider as an option when topical anesthetic is unavailable or as an add-on.



SCIG in pediatrics: Clinical context

SCIG is effective in preventing infections in children with primary immunodeficiency and is amenable to home administration with nurse-supported training[7]. Patient-reported outcomes favor SCIG in many cohorts. Health-economic assessments (pediatric and adult) generally show lower overall costs for home-based SCIG versus clinic-based IVIG, driven by reduced facility and staffing use.

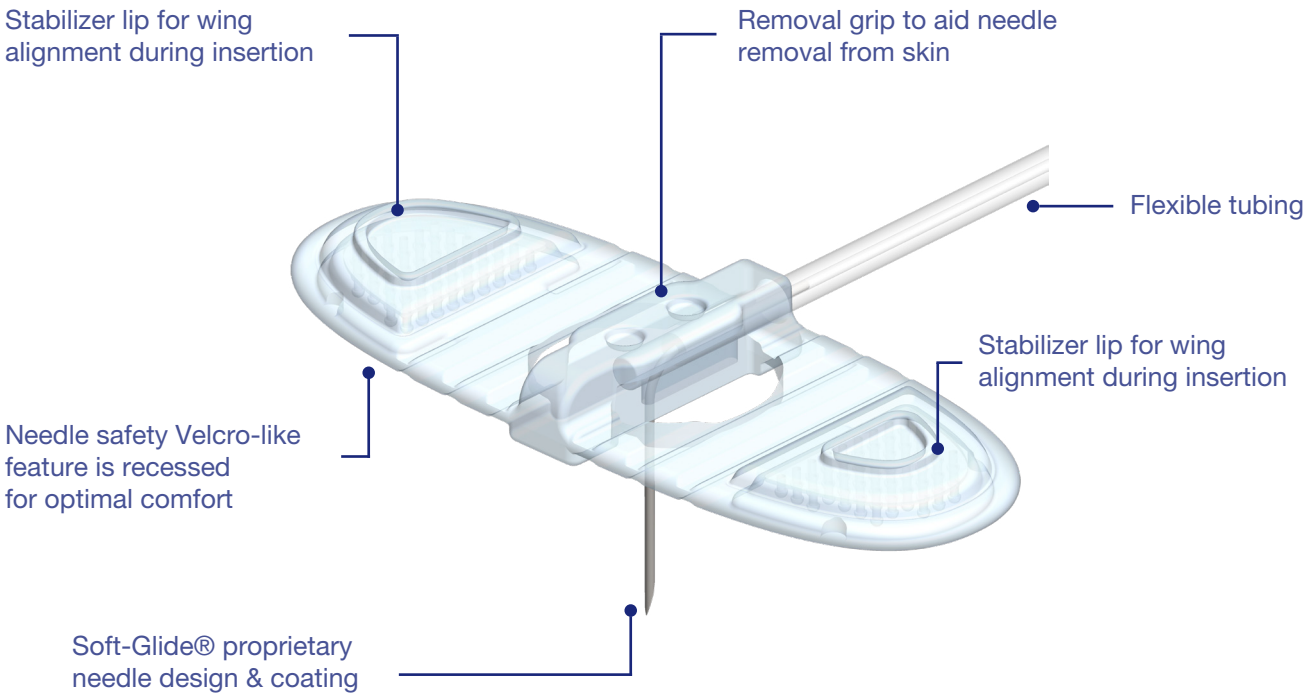
Advanced subcutaneous needle and delivery technologies: What matters and why

Needle sets
Key design variables that influence comfort, dwell time, and confidence include gauge, length, tip geometry, wing/safety design, and tubing configuration.

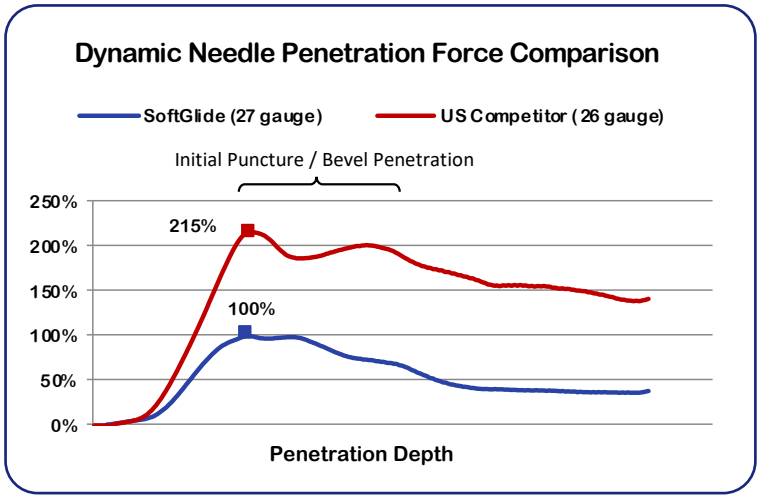
Gauges & lengths commonly used for SCIG
EMED 26G OPTFlow needles are available in 4-14 mm lengths.

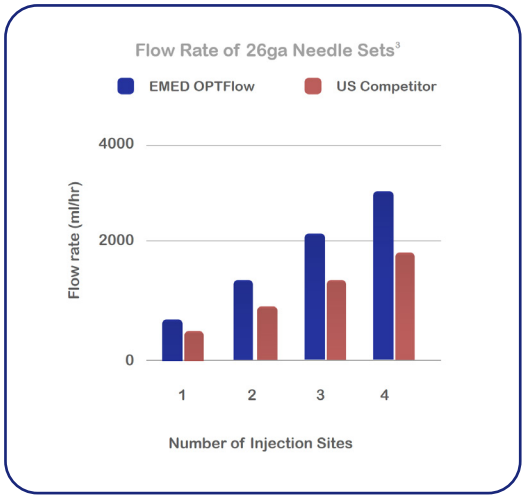
Needle shape, soft-glide coating, safety wings, soft-site dressing
Needle shape and Soft-Glide coating reduce insertion force, minimizing insertion trauma. The integrated safety enclosures mitigate needlestick risk at home and in the clinic.

The proprietary Soft-Site Dressing provides optimized adhesive coverage and comfort for patients.



De Beer et, al, *IgNS 2018 Scientific Poster* [15]



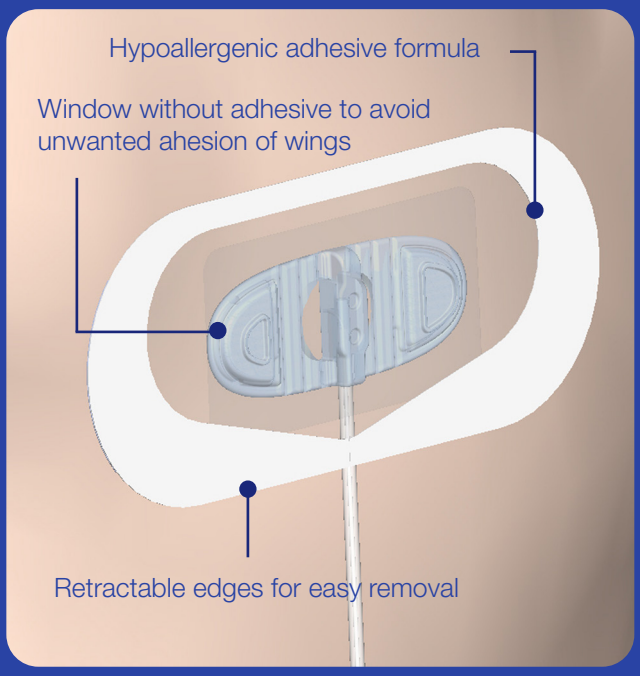


De Beer et, al, *IgNS 2018 Scientific Poster* [15]

Soft-Site Dressing

EMED's patented, hypoallergenic dressing is designed for SCIG patient comfort.

Edges can be lifted for easy removal, reducing pain and improving patient comfort.

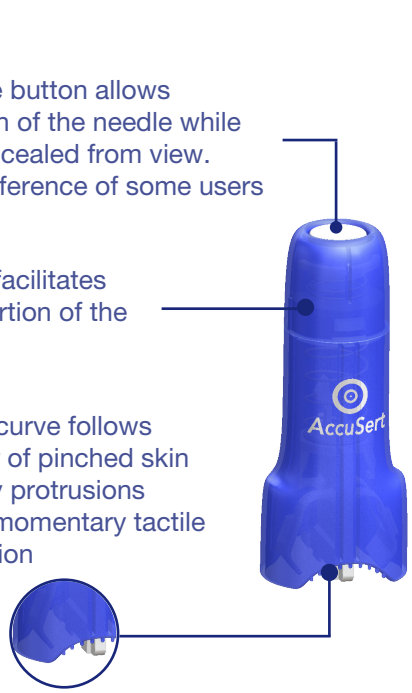


Multi-lead sets
Branched tubing allows parallel sites, shortening total infusion session time.

High-flow designs
Optimized needle curvature and tubing material target higher flow at the same gauge to reduce infusion session time.

Automatic inserters
Reusable inserters hide the needle and standardize insertion angle/depth—useful for anxious patients, especially children, and convenient for caregivers. Automatic inserters may play a significant role in the reduction of needle phobia symptoms and even the prevention of needle phobia if applied at the beginning of SCIG.

Samizadeh et, al, *IgNS 2025 Scientific Poster* [16]



Pumps and administration modalities

At-home ambulatory infusion pumps
The SCIg60 and VersaPump are mechanical, constant-pressure infusion pumps designed for subcutaneous administration of fluids. These devices enable multi-site infusions and portability.

These pumps allow patients to administer medicine subcutaneously with various needle gauges and infusion sites, providing options that always adhere to the current Prescribing Information for the specific medicine.

Clinical implication
When tolerated and within label, higher per-site volume and rate can reduce the number of needles and total infusion time—often the key drivers of acceptability by children.

Implementation details for clinics and home-infusion programs

1. First-dose experience matters
Conduct the initial 2–3 insertions in clinic or with a home-visit nurse using the full comfort bundle (anesthetic + distraction/VR + confident coaching).

2. Choosing the right set
Offer minimally traumatic OPTFlow needle sets, and select appropriate needle length, gauge and number of sites for patient's SC tissue and infusion dose.

3. Training and competency
Use a teach-back checklist covering setup, asepsis, site selection, 90° insertion with pinch or AccuSert needle inserter.

4. Follow-up evaluation
Track pain (0-10), fear, session duration, number of sites, local reactions, missed doses, and unplanned calls; adjust infusion devices and behavioral plan accordingly.

Conclusion

Pediatric needle phobia is common and modifiable. Pairing brief, evidence-based behavioral strategies with thoughtfully chosen SC needle technology and automatic inserters, can reduce distress, pain, and fear in patients, while shortening infusion time, and increasing caregiver confidence. This integrated approach improves the odds that families will adopt and sustain home-based SCIG safely and confidently.

References

1. McLenon J, Rogers M. The fear of needles: A systematic review and meta-analysis. J Adv Nurs. 2019; 75:30-42. https://doi.org/10.1111/jan.13818
2. McMurtry CM, Noel M, Taddio A, et al. Interventions for individuals with high levels of needle fear: Systematic review of randomized controlled trials and quasi-randomized controlled trials. Clin J Pain. 2015; 31(10 Suppl):S109-S123. https://doi.org/10.1097/AJP.0000000000000273
3. Orenius T, LicPsych, Säilä H, Mikola K, Ristolainen L. Fear of injections and needle phobia among children and adolescents: An overview of psychological, behavioral, and contextual factors. SAGE Open Nursing. 2018, 4:1-8. https://doi.org/10.1177/2377960818759442
4. McMurtry CM, Taddio A, Noel M, et al. Exposure-based interventions for the management of individuals with high levels of needle fear across the lifespan: a clinical practice guideline and call for further research. Cogn Behav Ther. 2016; 45(3):217-235. https://doi.org/10.1080/16506073.2016.1157204
5. Eijlers R, Utens EMWJ, Staals LM, et al. Systematic Review and Meta-analysis of Virtual Reality in Pediatrics: Effects on Pain and Anxiety. Anasth Analg. 2019;129(5):1344-1353. https://doi.org/10.1213/ANE.0000000000004165
6. Ballard A, Khadra C, Fortin O, et al. Cold and vibration for children undergoing needle-related procedures: A non-inferiority randomized clinical trial. Paediatr Neonatal Pain. 2024;6(4):164-173. https://doi.org/10.1002/pne2.12125
7. Paris K, Haddad E, Borte M, et al. Tolerability of Subcutaneous Immunoglobulin 20%, Ig20Gly, in Pediatric Patients with Primary Immunodeficiencies. Immunotherapy. 2019; 11(5):397-406. https://doi.org/10.2217/imt-2018-0088
8. https://cihr-irsc.gc.ca/e/52768.html?
9. https://pphc.uoguelph.ca/needle-fear-resources/?
10. https://idevax.com/2022/07/19/needle-phobia-an-overlooked-health-concern/?
11. Sefer AP, Kaya MS. Effectiveness, safety, and treatment satisfaction of 20% subcutaneous immunoglobulin replacement therapy in pediatric patients with primary and secondary immunodeficiencies. Turk Arch Pediatr. 2025;60(2):217–225. https://doi.org/10.5152/TurkArchPediatr.2025.24305
12. Gupta S, Kobayashi RH, Litzman J, Cherwin L, Hoeller S, Kreuwel H. Subcutaneous immunoglobulin 16.5% for the treatment of pediatric patients with primary antibody immunodeficiency. Expert Rev Clin Immunol. 2023;19(1):7–17. https://doi.org/10.1080/1744666X.2023.2144836
13. Clarke AE, Connell J, Remy-Martin L. Pediatric patient considerations for first dose of subcutaneous immunoglobulin therapy in the home. Optum Infusion Pharmacy; 2024.
14. Bilgic Eltan S, Keskin O, Deveci MF. Safety, efficiency, and treatment satisfaction in children with primary immunodeficiency receiving subcutaneous immunoglobulin treatment. North Clin Istanb. 2022;9(3):228–234. https://doi.org/10.14744/nci.2020.16870
15. De Beer N, Barbrie J, Gutierrez C, Lambert P, Optimizing Patient Comfort During Delivery of Subcutaneous IgG (SCIg). IgNS Conference Scientific Poster; 2018.
16. Samizadeh M, Hakim A, Piracha F, Clinical Evaluation of Patient-Reported Outcomes for Subcutaneous Infusion Systems in Pediatric Immunoglobulin Replacement Therapy. IgNS Conference Scientific Poster, 2025


EMED
Technologies