To instantiate the safety case for the Generic Patient-Controlled Analgesia (GPCA) system, specific information about "Overinfusion" and "Underinfusion" hazards, the use of scenarios, and detailed safety requirements are introduced. The placeholders "{}" in GSN elements are replaced with specific elements from the domain information:

\*\*Hierarchy Tree Structure of GPCA Safety Case:\*\*

- Goal (G1, Operational safety is verified in GPCA system)

- Strategy (S1, Argument over the satisfaction of all specs over GPCA system)

- Context (C1, All specs are given by FDA standard, Expertise opinion, and Previous knowledge)

- Goal (G2, All operational hazards are mitigated)

- Strategy (S3, Argument over operational hazards related to Overinfusion and Underinfusion)

- Context (C2, Operational hazards are given by Overinfusion and Underinfusion hazards)

- Goal (G3, Overinfusion is mitigated)

- Strategy (S4, Argument over the applied scenarios of Overinfusion)

- Context (C3, All related scenarios include flow rate mismatch, excessive bolus requests)

- Goal (G4, Overinfusion is mitigated under scenario of flow rate mismatch)

- Strategy (S5, Argument over all specs related to flow rate mismatch)

- Context (C4, All related specs are given by FDA standards)

- Goal (G5, Flow rate sensor is appropriate for flow rate mismatch)

- Strategy (S6, Argument the appropriateness of flow rate sensor over properties)

- Context (C5, Properties are given by setting limits and triggering alarms)

- Goal (G6, Property of flow rate less than 90% is appropriate for flow rate sensor)

- Strategy (S7, Argument over the source of the property definition)

- Context (C6, Source is given by FDA standards)

- Goal (G7, FDA standards are appropriate and trustworthy)

- Solution (Sn1, source as FDA standards)

- Goal (G8, Property definition of less than 90% flow rate is sufficient)

- Solution (Sn2, property definition related to flow rate limits and alarms)

This tree structure effectively elaborates each goal connected by strategies, supported by solutions, and contextualized by specific details, fully instantiated from the pattern using the information about the GPCA system and operational hazards. This layout provides a comprehensive argument for the safety of the GPCA system highlighting how each hazard is addressed through well-defined safety criteria and evidence.