To instantiate the provided safety case pattern for the Generic Patient-Controlled Analgesia (GPCA) system based on the domain information, I need to replace placeholders and expand abstract structures based on the domain specifications. Let's work through the hierarchical structure step-by-step:

### Top-Level Goal and Strategy

- \*\*G1: Operational safety is verified in GPCA system\*\*

- \*\*S1: Argument over the satisfaction of all specs over GPCA system\*\* \*(Undeveloped)\*

- \*\*G2: All operational hazards are mitigated\*\*

- \*\*S2: Argument over reliability in all suitable levels of GPCA system\*\* \*(Undeveloped)\*

- \*\*C1: All specs are given by specification instances concerning GPCA\*\*

### Drilling into specific operational hazards mitigation

- \*\*S3: Argument over operational hazards\*\*

- \*\*G3: Overinfusion is mitigated\*\*

- \*\*G3: Underinfusion is mitigated\*\*

- \*\*C2: Operational hazards are identified as 'Overinfusion' and 'Underinfusion'\*\*

### Developing strategies to cover specific scenarios against each hazard

#### For Overinfusion:

- \*\*S4: Argument over the applied scenarios of Overinfusion\*\*

- \*\*G4: Overinfusion is mitigated under excessive bolus requests scenario\*\*

- \*\*G4: Overinfusion is mitigated under flow rate mismatch scenario\*\*

- \*\*C3: All related scenarios are explained for each operational hazard\*\*

#### Scenario-Level Specifications for Overinfusion Mitigation:

- \*\*S5: Argument over all specs related to flow rate scenarios\*\*

- \*\*G5: Flow rate sensor is equipped is appropriate for flow rate mismatch scenario\*\*

- \*\*C4: All related specs are detailed for variable scenarios such as flow rate sensor requirements\*\*

##### Validating the properties and sources of the specifications

- \*\*S6: Argument the appropriateness of the specification over properties\*\*

- \*\*G6: Flow rate is less than 90% of the programmed rate setting is appropriate for the spec\*\*

- \*\*C5: Properties are specified as 'Flow rate is less than 90%', 'Programmed rate too low' etc.\*\*

#### Ensuring trustworthiness of sources

- \*\*S7: Argument over the source of the property definition\*\*

- \*\*G7: FDA standard is appropriate and trustworthy for specification sources\*\*

- \*\*G8: Expertise opinion definition is sufficient for safety requirements\*\*

- \*\*C6: Source is given by reference publications and standards\*\*

- \*\*Sn1: Reference to FDA standard documentation\*\*

- \*\*Sn2: Expertise opinion derived from clinical studies\*\*

### Hierarchical Display:

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- G1: Operational safety is verified in GPCA system

- S1: Argument over the satisfaction of all specs over GPCA system (Undeveloped)

- G2: All operational hazards are mitigated

- S2: Argument over reliability in all suitable levels of GPCA system (Undeveloped)

- C1: All specs are given by specification instances concerning GPCA

- S3: Argument over operational hazards

- G3: Overinfusion is mitigated

- G3: Underinfusion is mitigated

- C2: Operational hazards are identified as 'Overinfusion' and 'Underinfusion'

- S4: Argument over the applied scenarios of Overinfusion

- G4: Overinfusion mitigated under excessive bolus requests scenario

- G4: Overinfusion mitigated under flow rate mismatch scenario

- C3: All related scenarios are explained for each hazard

- S5: Argument over all specs related to flow rate scenarios

- G5: Flow rate sensor is equipped is appropriate for flow rate mismatch scenario

- C4: All related specs are detailed for variable scenarios

- S6: Argument the appropriateness of the specification over properties

- G6: Flow rate is less than 90% of the programmed rate setting is appropriate

- C5: Properties such as 'Flow rate is less than 90%', 'Programmed rate too low'

- S7: Argument over the source of the property definition

- G7: FDA standard is appropriate and trustworthy

- G8: Expertise opinion definition is sufficient

- C6: Source is given by reference publications and standards

- Sn1: Reference to FDA standard documentation

- Sn2: Expertise opinion derived from clinical studies

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