Below is the instantiated safety case for the Generic Patient-Controlled Analgesia (GPCA) system derived from the provided safety case pattern. It is displayed in a hierarchical tree format using dashes (-) to denote different levels:

- G1: Operational safety is verified in GPCA system

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

- C1: All specs are given by spec.allInstances()

- G2: All operational hazards are mitigated

- S3: Argument over operational hazards

- C2: Operational hazards are given by operational hazard.allInstances()

- G3: Overinfusion is mitigated

- S4: Argument over the applied scenarios of Overinfusion

- C3: All related scenarios are given by Overinfusion

- G4: Overinfusion is mitigated under scenario 1

- S5: Argument over all specs related to scenario 1

- C4: All related specs are given by scenario 1.spec.allInstances()

- G5: SR1.1 is appropriate for scenario 1

- S6: Argument the appropriateness of SR1.1 over properties

- C5: Properties are given by SR1.1.property.allInstances()

- G6: The flow rate sensor property is appropriate for SR1.1

- S7: Argument over the source of the flow rate sensor property definition

- C6: Source is given by flow rate sensor.property.source

- G7: FDA standard is appropriate and trustworthy

- Sn1: Source

- G8: Flow rate sensor definition is sufficient

- Sn2: Property

- G3: Underinfusion is mitigated

- S4: Argument over the applied scenarios of Underinfusion

- C3: All related scenarios are given by Underinfusion

- G4: Underinfusion is mitigated under scenario 2

- S5: Argument over all specs related to scenario 2

- C4: All related specs are given by scenario 2.spec.allInstances()

- G5: SR1.2 is appropriate for scenario 2

- S6: Argument the appropriateness of SR1.2 over properties

- C5: Properties are given by SR1.2.property.allInstances()

- G6: The period property is appropriate for SR1.2

- S7: Argument over the source of the period property definition

- C6: Source is given by period.property.source

- G7: Expertise opinion is appropriate and trustworthy

- Sn1: Source

- G8: Period definition is sufficient

- Sn2: Property

- G3: Dose limit exceeded due to excessive bolus requests is mitigated

- S4: Argument over the applied scenarios of Dose limit exceeded

- C3: All related scenarios are given by Dose limit exceeded

- G4: Dose limit is mitigated under scenario 3

- S5: Argument over all specs related to scenario 3

- C4: All related specs are given by scenario 3.spec.allInstances()

- G5: SR1.4 is appropriate for scenario 3

- S6: Argument the appropriateness of SR1.4 over properties

- C5: Properties are given by SR1.4.property.allInstances()

- G6: The bolus request limit property is appropriate for SR1.4

- S7: Argument over the source of the bolus request limit property definition

- C6: Source is given by bolus request limit.property.source

- G7: Previous knowledge is appropriate and trustworthy

- Sn1: Source

- G8: Bolus request limit definition is sufficient

- Sn2: Property

- G3: Bolus volume/concentration too high is mitigated

- S4: Argument over the applied scenarios of Bolus volume/concentration too high

- C3: All related scenarios are given by Bolus volume/concentration too high

- G4: Bolus volume/concentration is mitigated under scenario 4

- S5: Argument over all specs related to scenario 4

- C4: All related specs are given by scenario 4.spec.allInstances()

- G5: SR1.5 is appropriate for scenario 4

- S6: Argument the appropriateness of SR1.5 over properties

- C5: Properties are given by SR1.5.property.allInstances()

- G6: The concentration property is appropriate for SR1.5

- S7: Argument over the source of the concentration property definition

- C6: Source is given by concentration.property.source

- G7: Authority is appropriate and trustworthy

- Sn1: Source

- G8: Concentration definition is sufficient

- Sn2: Property

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

This safety case verifies that the operational safety of the GPCA (Generic Patient-Controlled Analgesia) system is ensured by mitigating the identified operational hazards, supported by appropriate strategies, contexts, and evidences.