Below is the instantiation of the safety case pattern for the Generic Patient-Controlled Analgesia (GPCA) system in a hierarchical tree format. The placeholders have been replaced by system-specific information and all additional decorators specific to assurance case patterns have been removed.

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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 GPCA system.allInstances()

- G2: All operational hazards are mitigated

- S3: Argument over operational hazards

- C2: Operational hazards are given by GPCA system.allInstances()

- G3: Overinfusion is mitigated

- S4: Argument over the applied scenarios of Overinfusion

- C3: All related scenarios are given by Overinfusion

- G4.0: 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()

- G5.0: Spec1 is appropriate for Scenario 1

- S6: Argument the appropriateness of Spec1 over properties

- C5: Properties are given by Spec1.property.allinstances()

- G6.0: Property1 is appropriate for Spec1

- S7: Argument over the source of the Property1 definition

- C6: Source is given by Property1.source

- G7: Source is appropriate and trustworthy

- Sn1: source: "FDA standard"

- G8: Property1 definition is sufficient

- Sn2: property: "Flow rate sensor is equipped"

- G4.1: Overinfusion 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()

- G5.1: Spec2 is appropriate for Scenario 2

- S6: Argument the appropriateness of Spec2 over properties

- C5: Properties are given by Spec2.property.allinstances()

- G6.1: Property2 is appropriate for Spec2

- S7: Argument over the source of the Property2 definition

- C6: Source is given by Property2.source

- G7: Source is appropriate and trustworthy

- Sn1: source: "Expertise opinion"

- G8: Property2 definition is sufficient

- Sn2: property: "Period (to trigger underinfusion alarm) is 15 minutes"

- G3.1: Underinfusion is mitigated

- S4: Argument over the applied scenarios of Underinfusion

- C3: All related scenarios are given by Underinfusion

- G4.0: Underinfusion 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()

- G5.0: Spec1 is appropriate for Scenario 1

- S6: Argument the appropriateness of Spec1 over properties

- C5: Properties are given by Spec1.property.allinstances()

- G6.0: Property1 is appropriate for Spec1

- S7: Argument over the source of the Property1 definition

- C6: Source is given by Property1.source

- G7: Source is appropriate and trustworthy

- Sn1: source: "FDA standard"

- G8: Property1 definition is sufficient

- Sn2: property: "Flow rate less than 90% of programmed rate setting"

- G4.1: 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()

- G5.1: Spec2 is appropriate for Scenario 2

- S6: Argument the appropriateness of Spec2 over properties

- C5: Properties are given by Spec2.property.allinstances()

- G6.1: Property2 is appropriate for Spec2

- S7: Argument over the source of the Property2 definition

- C6: Source is given by Property2.source

- G7: Source is appropriate and trustworthy

- Sn1: source: "Previous knowledge"

- G8: Property2 definition is sufficient

- Sn2: property: "Bolus volume/concentration too high"

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This safety case now reflects specific hazards, scenarios, and properties associated with the Generic Patient-Controlled Analgesia (GPCA) system, replacing all placeholders with concrete information. The undeveloped strategies are marked to indicate that further development is required.