To instantiate the safety case from the provided safety case pattern for the GPCA system, let us replace the placeholders `{system}`, `{operational hazard}`, `{scenario}`, `{spec}`, `{property}`, `{Source}` based on the information from the domain. We will integrate specific aspects like overinfusion and underinfusion hazards and related safety requirements.

Here's the instantiated assurance case for the GPCA system. The safety case hierarchy will be represented with dashes indicating different levels:

@Assurance\_case

- G1: Operational safety is verified in GPCA system

- C1: All specs are given by safety requirements (SR)

- S1: Argument over the satisfaction of all safety requirements over GPCA system

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

- G2: All operational hazards are mitigated

- C2: Operational hazards are given by overinfusion and underinfusion

- S3: Argument over operational hazards

- G3: Overinfusion is mitigated

- C3: All related scenarios are given by overinfusion scenarios

- S4: Argument over the applied scenarios of overinfusion

- G4: Overinfusion is mitigated under excessive bolus requests scenario

- C4: All related specs are given by SR1.10, SR6.1.3, SR6.1.4

- S5: Argument over all specs related to excessive bolus requests

- G5: Flow rate sensor is appropriate for excessive bolus requests

- C5: Properties are given by safety specification properties

- S6: Argument the appropriateness of flow rate sensor over properties

- G6: Flow rate sensing property is appropriate for flow rate sensor spec

- C6: Source is given by FDA standard

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

- G7: FDA standard is appropriate and trustworthy

- Sn1: Citation or evidence supporting FDA standard's trustworthiness

- G8: Flow rate sensing property definition is sufficient

- Sn2: Evidence or documentation proving adequacy of the flow rate sensing property definition

- [Additional branches can be added for underinfusion as explained for overinfusion with appropriate goals, strategies, contexts, and solutions for scenarios such as "Flow rate less than 90% of programmed rate setting" using safety requirements SR1.1, SR1.2, SR1.4, SR3.4.6.]

@End\_Assurance\_case

In this instantiated case, each element is either expanded or supported by another, linking strategies to goals and providing context and solutions as necessary. Each placeholder from the pattern is carefully replaced with specific references pertinent to the GPCA system's identified components and requirements. This hierarchical format helps visualize the overall reasoning structure of the safety case.