



Periop Policy Assistant Evaluation Report

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Report by
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1 Project Description

The periop policy assistant is a question-answering system developed by the Duke Institute for Health Innovation that enables users to ask questions about Duke Health's policies involving surgical practices. INSERT ANY ADDITIONAL INFORMATION HERE

2 Evaluation Description

The Question-Answer system was developed using Retrieval Augmented Generation (RAG), in which policies are embedded using an embedding model. At runtime, a user query is embedded and relevant documents are retrieved, added to the context, and an answer is provided using the user query and retrieved context. There are several components of the system that are important to evaluate. A gold-standard evaluation set was developed by asking members of the team to answer questions based on the text of a relevant policy. There are two separate components of the system which must be evaluated separately:

1. How often is the correct policy which contains the answer to the user's question returned?
2. Does the answer provided align with the context that is provided?

These will be answered using the following metrics:

1. Contextual Recall
2. Faithfulness

These are defined as follows:

Contextual Recall

Contextual recall is defined as the proportion of relevant documents that are retrieved. For the gold standard cases, the queries have 1 document which answers the question and is appropriate. Therefore, the contextual recall is simply the proportion of queries for which the correct document is retrieved.

$$\text{Contextual Recall} = \frac{\# \text{ Correct Document Retrieved}}{\# \text{ Total Queries}}$$

Faithfulness

Here, we define faithfulness to simply be whether or not the answer that is provided by the system is related to the context that was provided. This is currently evaluated via an LLM, and will be updated to use the GEval Framework. The rubric is defined in the following prompt:

You will be given a user query, the context that is provided to answer the query, and the response. Determine if the response aligns with context.

```
<query>
{query}
</query>

<context>
{context}
</context>

<response>
{response}
</response>
```

You should use the following rubric to determine the alignment score:

- If the response can be attributed to the context exactly, score 3
- If the response can be attributed to the context but with some minor differences, score 2
- If the response can be attributed to the context but with significant differences, score 1
- If the response cannot be attributed to the context at all, score 0

You should return the score as well as the specific span of text from the context that supports the response

- score: The alignment score

- relevant_spans: A list of spans of text from the context that supports the response

3 Contextual Recall Assessment

For each of the following queries, we will list the correct document and whether it was returned by the RAG system.

Input Text	Expected Output	Retrieval Context	Reference Documents	Correctly Retrieved?
Preoperatively, when do you need to do an ABO?	ABO needs to be completed prior to organ transplantation. For living donors...	DUH Organ Transplant Policy	s3://dihi-rag-dev/duke-health-policies-dec2020/documents/DUH_Organ_Transplant_Policy_(8210)_2.pdf	Y
What are the protocols for patient identification before surgery?	Prior to the commencement of a procedure, DUHS workforce members must use...	DUHS Patient Identification Policy	s3://dihi-rag-dev/duke-health-policies/documents/DUHS_Patient_Identification_Policy_(9165)_11.pdf	Y
What are the specific contraindications for using a pneumatic tourniquet?	The listed contraindications to pneumatic tourniquet use are: (1) Venous thromboembolism...	DUH Tourniquet Policy in the Operating Room	s3://dihi-rag-dev/duke-health-policies-dec2020/documents/DUH_Tourniquet_Policy_in_the_Operating_Room_(10205)_4.pdf	Y
Where do I place the Bovie pad on patient?	The Bovie pad is placed on clean, dry skin over a large muscle mass...	DRH Electrosurgical Unit and Electrosurgical Unit Safety	s3://dihi-rag-dev/duke-health-policies-dec2020/documents/DRH_Electrosurgical_Unit_and_Electrosurgical_Unit_Safety_(10718)_3.pdf	Y
Do you have to put initials on a patient prior to surgery? Do they have to be perfectly legible?	Yes, initials must be placed on the patient prior to surgery, and they must be legible...	DUHS Universal Protocol for Operative/Invasive Procedures	s3://dihi-rag-dev/duke-health-policies-dec2020/documents/DUHS_Universal_Protocol_for_Operative_Invasive_Procedures_(4706)_4.pdf	Y
When do I exsanguinate the limb when putting a tourniquet on the thigh in the operating room?	Inflation of the tourniquet cuff should be done under the direction of the surgeon...	DUH Tourniquet Policy in the Operating Room	s3://dihi-rag-dev/duke-health-policies-dec2020/documents/DUH_Tourniquet_Policy_in_the_Operating_Room_(10205)_4.pdf	Y

Input Text	Expected Output	Retrieval Context	Reference Documents	Correctly Retrieved?
Do I have to change my scrubs if I go to another surgery center?	Scrub attire is generally changed daily. However, under some conditions...	DUHS Guidelines for Surgical Attire	s3://dihi-rag-dev/duke-health-policies-dec2020/documents/DUHS_Guidelines_for_Surgical_Attire_(11467)_3.pdf	Y
Do we need to count instruments for hernia repair?	Yes. An initial instrument count (pre-incision) is required for procedures...	DUHS Counts: Instruments, Sponges, Sharps and Miscellaneous in the Operating Room	s3://dihi-rag-dev/duke-health-policies-dec2020/documents/DUHS_Counts_Instruments,_Sponges,_Sharps_and_Miscellaneous_in_the_Operating_Room_(13324)_4.pdf	Y
When do I have to do a timeout for a combination of a mastectomy and reconstruction case with a breast surgeon and a plastic surgeon?	The purpose of the time-out, immediately before starting the procedure, is to conduct...	DUHS Universal Protocol for Operative/Invasive Procedures	s3://dihi-rag-dev/duke-health-policies-dec2020/documents/DUHS_Universal_Protocol_for_Operative_Invasive_Procedures_(4706)_4.pdf	Y

Final Score: 100%

4 Faithfulness Assessment

Query 1: Preoperatively, when do you need to do an ABO?

Response: Preoperatively, an ABO verification must be completed in the following scenarios:

1. **ABO Pre Organ Arrival Verification:** If the recipient surgery will begin prior to the organ's receipt in the operating room, an ABO pre-organ verification must be completed prior to the induction of the recipient by two licensed healthcare professionals. This verification should be done as soon as possible if the recipient is in distress or requires stabilization prior to verification or if the patient is receiving continuous sedation prior to arrival in the OR. The intended recipient must be present in the OR during the verification. The recipient will not be moved to the OR table until the ABO pre-organ arrival verification is complete.
2. **Living Donor ABO & Other Vital Data Verification:** Verification of ABO compatibility must be completed between the living donor's arrival in the OR and prior to the induction of anesthesia of the living donor. This verification will be initiated by the circulator and include the Attending Recovering Surgeon and the circulating nurse. The verification must be documented in the donor intra-operative nursing record in real-time when performed.

Reference Text Spans:

- DUH Organ Transplant Policy, Effective Date: 12/21/2021, Entities: DUH
- 'If the recipient surgery will begin prior to organ receipt in the operating room an ABO pre-organ verification must be completed prior to induction of the recipient by two licensed health care professionals. If the recipient is in distress or requires stabilization prior to verification or if the patient is receiving continuous sedation prior to arrival in the OR, the verification should be completed as soon as possible. The intended recipient must be present in the OR during the verification. An ABO Pre Organ Arrival Verification is documented per organ unless organs are packaged together (e.g. kidney-pancreas).'
- 'Verification of ABO compatibility must be completed between living donor arrival in the OR and prior to anesthesia induction of the living donor. The verification will be initiated by the circulator to include the Attending Recovering Surgeon and the circulating nurse. The following will be documented by the circulating nurse in the donor intra-operative nursing record in real time when performed.'

Alignment Score: 3/3

Query 2: What are the specific contraindications for using a pneumatic tourniquet?

Response: The specific contraindications for using a pneumatic tourniquet, as outlined in the DUH Tourniquet Policy in the Operating Room, include:

1. Venous thromboembolism
2. Previous revascularization of the extremity
3. Extremities with dialysis access (e.g., arteriovenous grafts, fistulas)

4. Acidosis
5. Hemoglobinopathy (e.g., sickle cell anemia)
6. Extremity infection
7. Impaired circulation or peripheral vascular compromise
8. Medications (e.g., antihypertensives) and supplements (e.g., creatine)
9. History of pain or weakness in muscles or bones in extremities
10. Open fracture
11. Increased intracranial pressure

These contraindications should be assessed by the circulating nurse in collaboration with the surgeon and anesthesia professional before the application of a pneumatic tourniquet.

Reference Text Spans:

- DUH Tourniquet Policy in the Operating Room, Effective Date: 03/30/2017, Entities: DUH
- 'The circulating nurse should assess the patient for considerations related to tourniquet use, including ... screening for potential contraindications for tourniquet use, including venous thromboembolism, previous revascularization of the extremity, extremities with dialysis access (e.g., arteriovenous grafts, fistulas), acidosis, hemoglobinopathy (e.g., sickle cell anemia), extremity infection, impaired circulation or peripheral vascular compromise, medications (e.g., antihypertensives) and supplements (e.g., creatine), history of pain or weakness in muscles or bones in extremities, open fracture, and increased intracranial pressure.'

Alignment Score: 3/3

Query 3/3: Where do I place the Bovie pad on patient?

Response: The Bovie pad, also known as the dispersive electrode or grounding pad, should be placed on clean, dry skin over a large muscle mass and as close to the operative site as possible. Here are some specific guidelines for placement:

1. **Avoid Bony Prominences:** Do not place the pad over bony prominences.
2. **Avoid Hairy Surfaces:** Avoid placing the pad on areas with excessive hair.
3. **Avoid Metal Implants and Scar Tissue:** Do not place the pad over metal implants or scar tissue.
4. **Avoid Tattoos:** Do not place the dispersive pad over a patient's tattoo.
5. **Avoid Areas that Restrict Blood Flow:** Ensure the placement does not restrict blood flow.
6. **Ensure Uniform Contact:** The pad should maintain uniform contact with the skin, avoiding tenting, gapping, and liquids that might interfere with adhesion.

Special Considerations:

- If the patient has a titanium tip catheter, the Baxter transfer set tubing will easily screw onto the tip. For other types of tips, a Universal Adapter must be used.
- Pediatric electrosurgical ground pads should be used according to the weight limit specified by the manufacturer.

Documentation:

- The placement area of the pad should be documented in the patient's intraoperative record, along with the electrosurgical unit identification number, settings used, and the lot number of the dispersive pad.

Inspection:

- Inspect the dispersive electrode before each use for expiration, breakage, or fraying. Ensure all connections are intact and clean.

Removal:

- Remove the ground pad with care at the end of the procedure and assess the skin under the ground pad.

Reference Text Spans:

- DRH Electrosurgical Unit and Electrosurgical Unit Safety, Effective Date: 09/02/2022
- 'The dispersive pad shall be placed on clean, dry skin over a large muscle mass, and as close to the operative site as possible. Bony prominences, hairy surfaces, metal implants, and scar tissue shall be avoided. Do not place dispersive pad over a patient's tattoo. Dispersive pad placement, which may restrict blood flow, shall be avoided. All dispersive pads shall maintain uniform body contact. Potential problems include tenting, gaping, and liquids interfering with adhesion. The dispersive electrode shall be inspected before each use for expiration, breakage or fraying. All connections shall be intact and clean. Remove the ground pad with care at the end of the procedure. Assess the skin under the ground pad. The pad placement area shall be documented on the Intraoperative Record located in Centricity Perioperative Manager, along with the electrosurgical unit identification number; settings used and Lot number of dispersive pad.'

Alignment Score: 3/3

Query 4: Do you have to put initials on a patient prior to surgery? Do they have to be perfectly legible?

Response: Yes, the surgical/procedural site must be marked with the initials of the attending surgeon/proceduralist or first assistant using an indelible marker. The initials must be legible preoperatively. If the mark is not visible after skin prep, it must be confirmed by the attending surgeon and re-marked.

Reference Text Spans:

- DUHS Universal Protocol for Operative/Invasive Procedures, Effective Date: 10/28/2019, Entities: AHS, DHCH, DHIP, DPC, DRAH, DRH, DUH, PHMO, SOM
- 'Prior to entering the operating room/procedure room or performance of a regional block, the attending surgeon/proceduralist or first assistant will mark the surgical/procedural site with his/her initials using an indelible marker. Surgical/procedural site marking can be performed at any time prior to the procedure,

for example the day prior, as long as the initials of the individual performing the procedure are legible preoperatively. If the mark is not visible after skin prep, it must be confirmed by the attending surgeon and re-marked.’

Alignment Score: 3/3

Query 5: When do I exsanguinate the limb when putting a tourniquet on the thigh in the operating room?

Response: Exsanguination of the limb should be done before inflating the tourniquet. The specific steps for exsanguination are as follows:

1. **Exsanguinate the extremity before inflation of the tourniquet:**
 - An elastic wrap should be available for exsanguination.
 - The extremity should be elevated to allow venous blood to exit the limb.
 - If the patient has an infection, malignant tumor, or fractures in the operative extremity, exsanguination should be accomplished by extremity elevation alone.
2. **Alert the anesthesia professional before the extremity is wrapped.**

These steps ensure that the limb is properly exsanguinated, reducing the risk of complications during the procedure.

Referenced Policy:

- DUH Tourniquet Policy in the Operating Room, Effective Date: 03/30/2017, Entities to which the policy applied: DUH

Alignment Score: Unable to be determined

Query 6: Do I have to change my scrubs if I go to another surgery center?

Response: Yes, you must change your scrubs if you go to another surgery center. According to the policies, hospital-laundered surgical scrubs should not be worn outside the facility and must be changed prior to re-entering the restricted areas. This is to prevent cross-contamination and maintain a sterile environment.

Reference Text Spans:

- DRH DASC Operating Room Attire, Effective Date: 10/29/2020, Entities: DRH
- DUHS Guidelines for Surgical Attire, Effective Date: 11/21/2022, Entities: AHS, DRAH, DRH, DUH
- ‘When leaving the facility, personnel must change into their street clothes. If personnel leave the facility wearing scrub clothes, the scrub clothes must be changed prior to re-entering the restricted areas. All disciplines must change from hospital laundered surgical scrubs into street clothes prior to exiting Duke Health System Facilities. Hospital owned and laundered scrub attire may NOT be worn into the hospital from the outside.’

Alignment Score: 3/3

Query 7: Do we need to count instruments for hernia repair?

Response: Yes, an initial instrument count is required for hernia repair procedures. According to the policy, an initial instrument count must be performed on all procedures involving the possibility of entering the peritoneal, thoracic, or pelvic cavities. Since hernia repair often involves entering the peritoneal cavity, an initial instrument count is necessary.

Referenced Policies:

- DUHS Counts: Instruments, Sponges, Sharps and Miscellaneous in the Operating Room, Effective Date: 07/03/2023, Entities: DRAH, DRH, DUH
- 'V. Instrument counts a. An initial instrument count (before incision) is done on all procedures involving the possibility of entering the peritoneal, thoracic, or pelvic cavities.'

Alignment Score: 3/3

Query 8: When do I have to do a timeout for a combination of a mastectomy and reconstruction case with a breast surgeon and a plastic surgeon?

Response: For a combination of a mastectomy and reconstruction case involving both a breast surgeon and a plastic surgeon, you must perform a time-out at the following points:

1. **Initial Time-Out:** Before the start of the first procedure (mastectomy), a time-out must be conducted to confirm the correct patient, site, and procedure.
2. **Additional Time-Out:** When the second surgeon (plastic surgeon) joins the case for the reconstruction, another confirmatory time-out must be performed to verify the correct patient, procedure, and site before the second procedure begins.

This ensures that each surgeon and the entire procedural team are aligned and that patient safety is maintained throughout the combined procedures.

Referenced Policies:

- DUHS Universal Protocol for Operative/Invasive Procedures, Effective Date: 10/28/2019, Entities: AHS, DHCH, DHIP, DPC, DRAH, DRH, DUH, PHMO, SOM
- DRH DASC Universal Protocol/Procedural Verification, Effective Date: 11/02/2020, Entities: DRH
- 'When two or more procedures are being performed on the same patient (by two different surgeons/proceduralists and/or requiring a change of patient position), an additional confirmatory time-out is performed to confirm each subsequent procedure before it is initiated.'

Alignment Score: 3/3