CQL Suggestions - Structural Definition

Suggestions will come in 6 basic forms described by the type attribute.

- Follow a Link (suggestion-link)
- Get Counseling (counseling-link)
- Set a Blood Pressure Goal (bp-goal)
- Set a Behavioral Goal (goal)
- Update Behavioral Goal Progress (update-goal)
- Confirm Adverse Event Treatment (adverse-event)

Multiple suggestions are possible for any single recommendation and do not have to be of the same type. For example, if a patient is a current smoker, they may get two suggestions - one to get counseling and one to set a goal.

A suggestion must always have an id. This id is somewhat arbitrary except when suggesting a behavioral goal, as will be discussed later.

Follow a Link

This is meant for general actions we want the patient to take such as entering more blood pressure readings. Usually this will point to another page in the application. Multiple links are possible for a single suggestion using the actions array.

Here's how it would look in the application:

Suggestion for General Actions (links)

Actions:

Contact your care provider.

Enter more Blood Pressure readings.

```
[{
    "id": "suggestion-id",
    "type": "suggestion-link",
    "label": "Actions:",
    "actions": [
        {"label":"Contact your care provider", "url":"/contact"},
        {"label":"Enter more Blood Pressure readings", "url":"/bp-readings"}
    ]
}]
```

The link for the contact page in the application has special processing that will pre-populate a form to send to the care team.

Contact

Pre-Populated Note Based on Recommendations

Stage 2 Hypertension possible. Blood pressure readings of >140/90 mmHg may indicate that diagnosis of stage 2 hypertension can be considered.

[Send to Epic] [Copy and Paste]

In order for this to work, the CQL suggestion must provide a token in the url. For example:

```
[{
    "id": "suggestion-id",
    "type": "suggestion-link",
    "label": "Actions:",
    "actions": [
        {"label":"Contact us", "url":"/contact?token=possible-htn-stage2"}
    ]
}]
```

That token is linked to a message in the application database. New tokens and messages can be provided to Matt Storer for inclusion.

Get Counseling

This is similar to following a link with a few differences:

- Clicking on the link creates a record indicating the patient was counseled
- A references object is provided to be saved with the counseling record. This allows the decision support system to distinguish between different types of counseling (e.g. smoking vs weight loss)

Here's how this will look in the application:

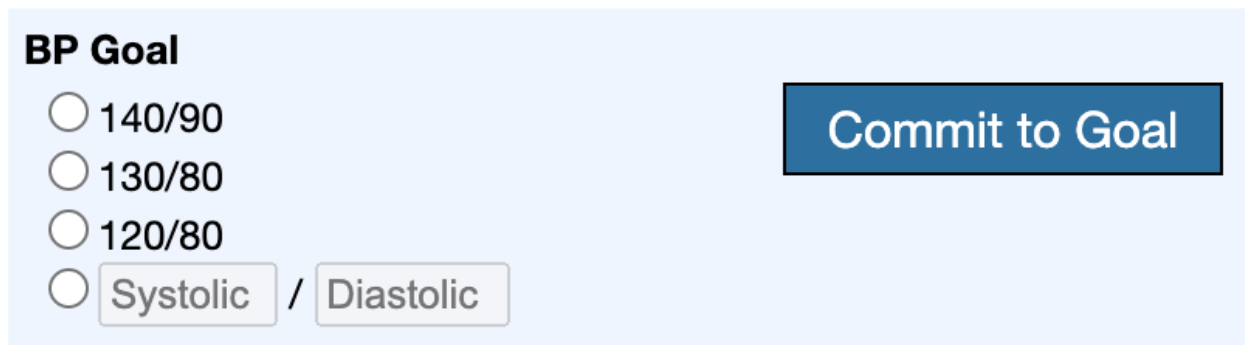## Suggestion for Counseling

Suggested Counseling:

Learn more about tobacco cessation.

```
[{
    "id": "smoking-counseling",
    "type": "counseling-link",
    "references": {"system":"http://snomed.info/sct", "code":"225323000"},
    "label": "Suggested Counseling:",
    "actions": [
        {"label":"Learn more about tobacco cessation.",
"url":"/counseling/smoking-cessation"}
    ]
}]
```

Set a Blood Pressure Goal

> *Note: The application automatically sets a goal of 140/80 the first time it sees a patient. The recommendation that would normally show this goal suggestion never fires, since a goal already exists.*

This suggestion allows a user to set their own Blood Pressure goal. Here is what it would look like in the application:

And this is how the suggestion is constructed in json:

```
[{
    "id": "bp-radio-goal",
    "label": "BP Goal",
    "type": "bp-goal",
    "references":{"system":"https//coach.ohsu.edu", "code":"blood-pressure"},
    "actions": [
        {"label":"140/90"},
        {"label":"130/80"},
        {"label":"120/80"}
    ]
}]
```

The action labels must be simple slash-delimited numbers, and the application provides an opportunity for the patient to set their own numbers.

Set a Behavioral Goal

This suggestion allows the patient to set behavioral goals and choose a date to commit to each goal. Goals can come in 4 different formats. They can be:

- Free text
- Radio Buttons
- Prescribed (A single predetermined goal that can be committed to)
- Mad Libs style (A structure but flexible prescribed goal - e.g., Eat <u>vegetables</u> <u>frequency</u> times per week.)

This is what the different goal types look like in the application:

The "Mad Libs" style goal was added later, allowing presentation of a partially prescribed goal that the user can fill in. "Mad Libs" style goals also allow for free text if the patient prefers.

Goals need a references object so the decision support system can distinguish the category of goal being committed to. The FHIR value set for Goal categories was not specific enough for our purposes, so these are internally used to help distinguish and the system is always "https://coach.ohsu.edu". This is a list of the currently used references:

Code	Display
smoking-cessation	Smoking Cessation
weight-loss	Weight Loss
alcohol-moderation	Alcohol Moderation
nutrition	Nutrition
physical-activity	Physical Activity

When represented in JSON, freetext goals have no actions. Radio goals have an action for each choice with a label describing the goal. Prescribed goals should have just a single action describing the goal, but there may be more than one suggestion with different prescribed actions, meaning the user could set more than one goal each with their own commit dates. And finally, Mad Libs style is a prescribed goal with specially formatted text.

```
# Freetext Goal Suggestion - No actions needed
[{
    "id": "freetext-smoking-goal",
    "type": "goal",
    "references": {"system":"https//coach.ohsu.edu", "code":"smoking-
cessation", "display":"Smoking Cessation"},
    "label": "Set a tobacco cessation goal:",
    "actions": [
    ]
}]

# Goal Suggestion with Radio Buttons - Multiple actions, one for each radio
button
[{
    "id": "radio-smoking-goal",
    "type": "goal",
    "references": {"system":"https//coach.ohsu.edu", "code":"smoking-
cessation", "display":"Smoking Cessation"},
    "label": "Set a tobacco cessation goal:",
    "actions": [
        {"label":"Reduce my smoking by half"},
```

```
            {"label":"Quit smoking completely"}
    ]
}]

# Goal Suggestions with Prescribed Actions - Multiple suggestions, one for
each possible goal
[{
    "id": "smoking-goal-prescribed1",
    "type": "goal",
    "references": {"system":"https//coach.ohsu.edu", "code":"smoking-
cessation", "display":"Smoking Cessation"},
    "label": "Reduce",
    "actions": [
        {"label":"Reduce/quit smoking."},
    ]
},{
    "id": "smoking-goal-prescribed2",
    "type": "goal",
    "references": {"system":"https//coach.ohsu.edu", "code":"smoking-
cessation", "display":"Smoking Cessation"},
    "label": "Replace",
    "actions": [
        {"label":"Use a nicotine replacement product."},
    ]
},{
    "id": "smoking-goal-prescribed3",
    "type": "goal",
    "references": {"system":"https//coach.ohsu.edu", "code":"smoking-
cessation", "display":"Smoking Cessation"},
    "label": "Support",
    "actions": [
        {"label":"Join a support group."},
    ]
}]

# Mad Libs style. A prescribed action with specially formatted text. [<what
gets displayed>:<type>]
[{
    "id": "smoking-goal-madlibs",
    "type":"goal",
    "references": {"system":"https//coach.ohsu.edu", "code":"smoking-
cessation", "display":"Smoking Cessation"},
    "label": "Set a Tobacco Cessation Goal",
    "actions": [
        {"label": "Reduce tobacco to [amount:number] [product:text] per
week."}
    ]
}]
```

The id of the goal does need to be unique so that multiple goals can be supported and the application and CQL can effectively communicate about the status of these goals. The CQL ensures a goal suggestion provides a unique id by appending a date/timestamp to the ids. So a suggestion will generally look more like this:

```
# CQL adds timestamp so id is unique
[{
    "id": "alcohol-goal-2021-09-30T12:37:34.245",
    "type": "goal",
    "references": {"system":"https//coach.ohsu.edu", "code":"alcohol-
moderation", "display":"Alcohol Moderation"},
    "label": "Set an alcohol moderation goal:",
    "actions": [
    ]
}]
```

Update Behavioral Goal Progress

This suggestion tells the application that at least one goal needs to be updated (because the commit date has passed). The id and references should be the same as what was provided in the previous goals suggestion.

This will look something like this in the application:
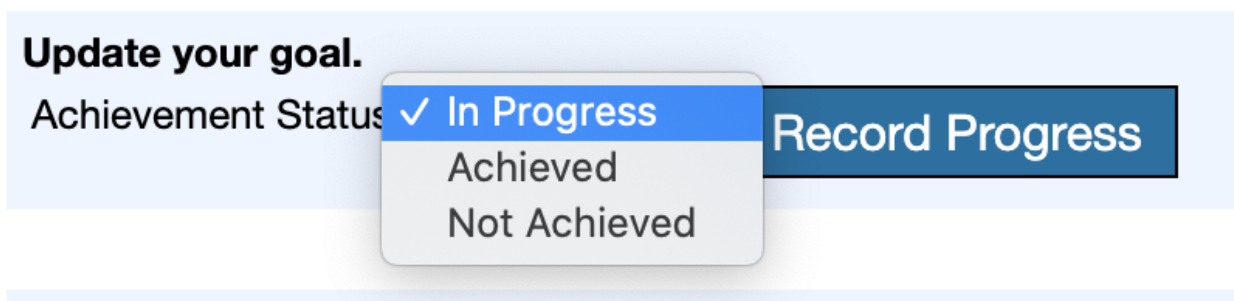

```
# Suggestion to Update goal (No action needed.)
[{
    "id": "radio-smoking-goal",
    "type": "update-goal",
    "references": {"system":"https//coach-dev.ohsu.edu", "code":"smoking-
cessation", "display":"Smoking Cessation"},
    "label": "Update your goal.",
    "actions": [
    ]
}]
```

Confirm Adverse Event Treatment

When the application detects a condition that may have occurred as a result of anti-hypertensive medication, a recommendation is triggered from the Adverse Event workflow. The first time an event is seen, the recommendation suggests that the patient contact the care team, and provides a yes/no radio for the patient to indicate whether they have done so. Here's what this looks like:

Have you discussed any of these conditions with your care team?

Acute kidney problem

○ Yes
○ No

Register Action

Brief loss of consciousness

○ Yes
○ No

Register Action

CQL is used to iterate through the adverse events, so it can't be hard-coded in JSON. But generally, it ends up looking like this:

```
[
 {
        "id": <adverse_event_id>,
        "label": "Acute Kidney Problem",
        "type": "adverse-event"
 },
 {
        "id": <adverse_event_id>,
        "label": "Brief Loss of Consciousness",
        "type": "adverse-event"
 }
]
```