

# Supplementary Appendices

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## Appendix 1. Vignettes

### Case A (Hyperlipidemia Case 1)

A 57-year-old man presents for a health maintenance exam. He reports overall good health and has no specific complaints. Medical history is remarkable for hypertension, a single episode of gout about three years ago, gastroesophageal reflux, and seasonal allergies. Medications include hydrochlorothiazide, Prilosec OTC, and use of a nasal steroid spray as needed. He used to smoke but quit 17 years ago. He drinks 2-4 alcoholic beverages per day. He works as a postal clerk and doesn't get much exercise. Family history is remarkable for heart attack in a paternal aunt at age 62 and diabetes mellitus among several grandparents, aunts, and uncles.

Exam: BP 136/88, pulse 66, weight 86kg, height 172 cm (BMI 29.1), otherwise unremarkable.

Labs: total cholesterol 206, LDL 126, HDL 36, triglycerides 234, fasting glucose 88, creatinine 0.9.

### Case B (Hyperlipidemia Case 2)

A 71-year-old woman presents for annual follow-up of multiple chronic conditions, including hypertension, hyperlipidemia, hypothyroidism, COPD, and osteoarthritis. Medications include hydrochlorothiazide, Lisinopril, simvastatin 80mg daily, levothyroxine, Atrovent inhaler, and Tylenol. She smokes 1 pack per day and uses 1-3 alcoholic beverages daily. She walks about a half mile on a treadmill each day, but activity is somewhat limited by her breathing. Family history includes heart attacks in her father at age 73, her mother at age 68, and a maternal uncle at age 64.

Exam: BP 144/90, pulse 72, weight 77kg, height 166cm (BMI 27.9). She has a short systolic murmur at the right upper sternal border, decreased breath sounds in all lung fields, and thyroid is not palpable. Exam is otherwise unremarkable.

Labs: fasting glucose 107, total cholesterol 216, LDL 139, HDL 32, triglycerides 226, creatinine 1.1, AST 31, TSH 3.2, urinalysis normal.

### Case C (Syncope Case 1)

A 68-year-old man comes to your office for evaluation of "passing out" four days ago. As he was raking leaves in his backyard on a cool fall day he abruptly felt lightheaded and nauseated, and fell. His wife, who was working nearby, saw him collapse and says he never fully lost consciousness although he was a bit "out of it" for a couple of minutes. However, he was quickly back to his normal self and refused to go to the emergency room. Instead, he continued to work in the garden and has felt completely fine ever since. He only comes to see you because of his wife's concern. He has never passed out before. Past history is remarkable for hypertension (treated with lisinopril and amlodipine), hyperlipidemia (treated with atorvastatin), and inguinal hernia repair 3 years ago. Father died of a heart attack at age 78, mother is alive and relatively healthy at 91.

Exam: BP 124/82, pulse 66, weight 88 kg., 1/6 early-peaking systolic murmur at the LUSB. Remainder of exam, including orthostatic BP, is unremarkable.

### Case D (Syncope Case 2)

A 29-year-old woman comes in for evaluation of recurrent syncope. She's had trouble "passing out" for at least a decade and had a "very limited evaluation" seven years ago that was reportedly normal (no records available). Symptoms have gradually become more frequent over the past 2 years, and a couple of close friends encouraged

her to come to you. Symptoms always occur immediately after standing, especially after prolonged sitting or on warm days. She will feel clammy, sweaty, and lightheaded ("like the room is going dark"), and must sit back down immediately. Even after sitting she will often "lose consciousness" for a minute or so. She feels fine immediately after these spells and typically gets a drink of water and then goes on about her activities. She is now having spells like this almost every week. Past history is remarkable for non-ulcer dyspepsia (EGD 3 years ago was normal). Family history is remarkable for mother with breast cancer at age 62, father with hypertension. She takes no medications.

Exam: BP 108/70, pulse 88, weight 67 kg. Exam is entirely unremarkable, including orthostatic BP.

## Appendix 2. Assessment of clinician attitudes: Item wording and creation of attitude covariates

We sought a parsimonious set of attitudes as potential predictors for covariate analysis. We first used prior surveys and review articles to generate a list of relevant themes, and from these themes developed 13 Likert-type items regarding clinical guidelines and practice variation. We pilot-tested these items with two internal medicine physicians, and incorporated their suggestions as we iteratively reviewed and revised all items.

We pre-selected two of the 13 attitude items ("Most practice variation among clinicians is justified by relevant differences in clinical situations" and "Between-clinician practice variation can realistically be substantially reduced") as single-item covariates. We used principal components factor analysis to identify clusters among the remaining 11 items, as outlined below.

### Initial set of 13 attitude items

1. Clinicians should always apply the latest research findings to each patient.
2. Clinicians have a responsibility to help reduce the overall cost of medical care.
3. Reducing variation in clinical practice would benefit most patients.
4. It is hard to find and quickly comprehend state-of-the-art practice standards when I need them.
5. Reducing variation in clinical practice would reduce costs.
6. I trust the findings in most research studies and systematic reviews.
7. I depend on practice guidelines to help me provide optimal care for my patients.
8. It is easy to apply practice guidelines to most of my patients.
9. Most practice variation among clinicians is justified by relevant differences in clinical situations.
10. I am quick to adapt my clinical practice to align with new practice guidelines.
11. Clinicians should encourage patients to follow guideline recommendations for diagnosis and treatment.
12. Clinicians should resist patient requests that are not grounded in solid evidence of benefit.
13. Between-clinician practice variation can realistically be substantially reduced.

Notes:

- Response options for all 13 items were: 1 = strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = slightly agree, 5 = agree, 6 = strongly agree.
- Participants responded to items 1-12 prior to viewing the first vignette, and responded to item 13 after completing the last vignette in Phase 3.

### Identification of item clusters (factor analysis)

We selected two items (#9 and #13) as single-item covariates.

We used principal components factor analysis to identify clusters among the remaining 11 items. We identified three factors using both the scree plot and eigenvalue >1. Factor loadings are shown below.

Item	Factor 1	Factor 2	Factor 3
1. Clinicians should always apply the latest research findings to each patient.	0.13	-0.07	<b>0.79</b>
2. Clinicians have a responsibility to help reduce the overall cost of medical care.	<b>0.56</b>	0.38	0.00
3. Reducing variation in clinical practice would benefit most patients.	<b>0.85</b>	0.05	0.08
4. It is hard to find and quickly comprehend state-of-the-art practice standards when I need them.	0.21	<b>-0.72</b>	0.20
5. Reducing variation in clinical practice would reduce costs.	<b>0.85</b>	0.07	-0.06
6. I trust the findings in most research studies and systematic reviews.	-0.04	0.28	<b>0.72</b>

7. I depend on practice guidelines to help me provide optimal care for my patients.	0.29	<b><u>0.63</u></b>	0.33
8. It is easy to apply practice guidelines to most of my patients.	0.24	<b><u>0.69</u></b>	0.16
10. I am quick to adapt my clinical practice to align with new practice guidelines.	0.30	<b><u>0.49</u></b>	0.39
11. Clinicians should encourage patients to follow guideline recommendations for diagnosis and treatment.	<b><u>0.57</u></b>	0.37	0.35
12. Clinicians should resist patient requests that are not grounded in solid evidence of benefit.	<b>0.44</b>	-0.02	0.26

Note: Bolded text indicates items with factor loading >0.4. Underlined text indicates factor loading  $\geq 0.2$  more than next-highest loading (i.e., unique loading).

We then created clusters using the highest factor loading for each item.

#### Cluster 1.

- 2. Clinicians have a responsibility to help reduce the overall cost of medical care.
- 3. Reducing variation in clinical practice would benefit most patients.
- 5. Reducing variation in clinical practice would reduce costs.
- 11. Clinicians should encourage patients to follow guideline recommendations for diagnosis and treatment.
- 12. Clinicians should resist patient requests that are not grounded in solid evidence of benefit.

*Cronbach's alpha = 0.74*

*Proposed label: **Reducing variation would improve patient care.***

#### Cluster 2.

- 4. (scoring was reversed when calculating cluster score) It is hard to find and quickly comprehend state-of-the-art practice standards when I need them.
- 7. I depend on practice guidelines to help me provide optimal care for my patients.
- 8. It is easy to apply practice guidelines to most of my patients.
- 10. I am quick to adapt my clinical practice to align with new practice guidelines.

*Cronbach's alpha = 0.63*

*Proposed label: **Clinical guidelines are useful and usable.***

#### Cluster 3.

- 1. Clinicians should always apply the latest research findings to each patient.
- 6. I trust the findings in most research studies and systematic reviews.

*Cronbach's alpha = 0.52*

*Proposed label: **New research should be applied in practice.***

## Final attitude covariates

For each cluster as listed above, we calculated an average score across the constituent items.

Covariate	Cronbach's alpha	Mean (SD)	Agree*
Item 9. Most practice variation among clinicians is justified by relevant differences in clinical situations.	-	3.9 (1.2)	73/204 (37%)
Cluster 1. Reducing variation would improve patient care.	0.74	4.6 (0.7)	123/204 (60%)
Cluster 2. Clinical guidelines are useful and usable.	0.63	4.3 (0.7)	99/204 (49%)
Cluster 3. New research should be applied in practice.	0.52	4.4 (0.8)	118/204 (58%)
Item 13. Between-clinician practice variation can realistically be substantially reduced.	-	4.1 (1.0)	46/153 (30%)

\* In light of possible social-desirability influences, acquiescence bias, and the distribution of actual responses, we dichotomized scores  $>4.5$  (i.e., agree or strongly agree) as "agree," and scores  $\leq 4.5$  (slightly agree or disagree) as "disagree".

## Appendix 3. Instructions and questions for responding to vignettes

### Phase 1. Unguided responses

#### Heading: "Clinical Scenarios: Your own approach"

##### Instructions

On the screens that follow you will be presented with a series of short clinical scenarios. Please manage each case as you would in **your clinical practice**. There is **NOT** a "best" or "correct" answer. In many cases the answer may be controversial. Your responses should reflect your clinical practice, which may differ from national guidelines.

Your response might include specific diagnostic tests, treatment recommendations, seeking information online, curbside consultation, formal referral, follow-up appointments, etc.

**See the example below** to get an idea of the type and length of expected response. [*Vignette portraying a patient presenting for routine management of hypertension was given, along with an investigator-written narrative management plan provided; not shown here.*]

You will probably do several things during each encounter (not just a single "next step" or "next test"). Please describe everything you would do, and also include details for the most likely contingencies (e.g., "If the CXR is negative then I would XXX.").

We recognize that the scenarios do not include patient preferences. **You may make assumptions regarding patient preferences or other details not mentioned in the case**; then please describe these in your response. Your response may be recommendations, or may be more directive.

**\*\*\* Each vignette scenario presented, each followed by the same series of questions (below) \*\*\***

##### Post-vignette text and questions

**What would you do next in managing this patient's [lipids / spells]?**

*Please outline everything you would do during or immediately after this encounter. Be as specific as possible.*

How difficult were the clinical decisions in this case?

- Not difficult at all
- Slightly difficult
- Moderately difficult
- Very difficult

How confident are you that your plan, as outlined above, is the ideal approach for this particular patient?

- Not confident (multiple acceptable options)
- Slightly confident
- Moderately confident
- Very confident (clearly the best approach)

How much variability do you think there would be in the management of this case among other providers in your specialty?

- No variability (strong consensus)
- Slight variability
- Moderate variability
- High variability (little consensus)

## Phase 2. Algorithm-guided responses

### Heading: "Clinical Scenarios: Guided by AskMayoExpert CPMs"

#### Instructions

Next you'll manage the same four cases, but this time you will use **the AskMayoExpert care process models** (CPMs) for Hypercholesterolemia <hyperlink> or Syncope <hyperlink>. Please **respond based on the CPM as closely as possible**, even if this conflicts with what you would normally do. **Our goal is to determine how well the CPMs work in clinical practice.**

You will probably do several things during each encounter (not just a single "next step" or "next test"). Please describe everything you would do, and also include details for the most likely contingencies (e.g., "If the CXR is negative then I would XXX.").

We recognize that the scenarios do not include patient preferences. **You may make assumptions regarding patient preferences or other details not mentioned in the case**; then please describe these in your response. Your response may be recommendations, or may be more directive.

**\*\*\* Each vignette scenario presented, each followed by the same series of questions (below) \*\*\***

#### Post-vignette text and questions

If not already open, click [here](#) to access the [topic] care process model.

**What would you do next in managing this patient's [lipids / spells] (as guided by the CPM)?**

*Please outline everything you would do during or immediately after this encounter. Be as specific as possible.*

How easy was it to apply the CPM to this case?

- Very easy,
- Somewhat easy
- Somewhat difficult
- Very difficult

How much variability do you think there would be in the management of this case among other providers in your specialty *if everyone used the CPM?*

- No variability (strong consensus)
- Slight variability
- Moderate variability
- High variability (little consensus)



## Phase 3. Ideal approach

### Heading: "What is the ideal approach?"

#### Instructions

Now that you have outlined two different management plans for each scenario, we want to know: What is the ideal approach?

For each of the four cases, we want you to:

1. Indicate whether you prefer your original management plan, or the plan you created using the care process model (CPM), and
2. Create an "ideal" management plan (which could be identical to one of the plans you've already outlined, or could combine ideas from both).

We are **NOT** looking for a single "correct" or "best" answer – we want to **know what you really believe is best for this patient**.

**\*\*\* Each vignette scenario presented, each followed by the same series of questions (below) \*\*\***

#### Post-vignette text and questions

Here is YOUR original plan:

<quote of their original response>

Here is your CPM-guided plan:

<quote of their original response>

Which management plan do you prefer?

- Strongly prefer my original
- Slightly prefer my original
- Slightly prefer CPM-guided
- Strongly prefer CPM-guided

In your opinion, what would be the "ideal" approach for this patient?

- My original plan
- My CPM-guided plan
- A combination of these plans ... If you select this option, please describe your ideal plan in the box below. **You may copy and paste** from the text above as a starting point; or you can just focus on the differences (e.g. "Would do my original plan, except would also ...").

## Appendix 4. Characteristics of respondents completing Phase 1 and Phase 3

Characteristic	Feature	Phase 1 No. (%) N=204	Phase 3 No. (%) N=153
<b>Clinician type</b>	Physician	142 (70%)	105 (69%)
	Nurse practitioner	53 (26%)	41 (27%)
	Physician assistant	9 (4%)	7 (6%)
<b>Specialty</b>	Cardiology	70 (34%)	51 (33%)
	Family medicine	67 (33%)	51 (33%)
	Internal medicine	67 (33%)	51 (33%)
<b>Practice type</b>	Academic	172 (84%)	129 (84%)
	Community	32 (16%)	24 (16%)
<b>Time in practice (years)*</b>	≤10	91 (46%)	70 (47%)
	11-20	53 (27%)	39 (26%)
	>20	54 (27%)	39 (26%)
<b>Attitude: Most variation is justified by differences in situations</b>	Agree	73 (37%)	48 (31%) <sup>†</sup>
<b>Attitude: Reducing variation would improve patient care</b>	Agree	123 (60%)	96 (63%)
<b>Attitude: Clinical guidelines are useful and usable</b>	Agree	99 (49%)	73 (48%)
<b>Attitude: New research should be applied in practice</b>	Agree	118 (58%)	88 (58%)
<b>Attitude: Variation can realistically be reduced</b>	Agree	NA <sup>‡</sup>	46 (30%) <sup>‡</sup>

All P ≥0.22 for comparisons of those who did vs did not complete Phase 3, except as noted.

\* N=198.

<sup>†</sup> P=.02 comparing those who did vs did not complete Phase 3.

<sup>‡</sup> This item appeared at the end of the survey.