Appendix:

Model Structure

The Markov model contains 28 states of health. Appendix Figure 1 shows the 3 strategies compared – no antithrombotic therapy, aspirin, and warfarin (target INR 2-3) – at the solid black, square decision node. The bracket after the 3 strategies indicates that the sub-trees are attached to each strategy. A simplified list of the Markov states is shown next at the Markov node. The actual model contains 28 states. Many of the states not shown in this figure are additional combination states for several events, such as short-term symptoms after intracerebral hemorrhage and long-term symptoms after embolism, or temporary states that last a single cycle, such as the first month after an intracerebral hemorrhage or ischemic stroke. In addition, there are separate states for each level of functional outcome after intracerebral hemorrhage (that is, Glasgow Outcome Scale score of 3, 4, or 5). At the beginning of the Markov, patients start in the state appropriate to the treatment strategy. For instance, those receiving warfarin start in the state, “Well on Warfarin,” while those not receiving antithrombotic therapy start in the state, “Well off Warfarin.”

Appendix Figure 2 illustrates the chance events that may occur during each monthly cycle. Chance events are denoted by solid black, circular chance nodes. Patients face the same chance events during each monthly cycle of the simulation. Patient-specific decision analyses are performed by setting parameter values for these chance events based upon a given patient’s risk profile for ischemic stroke due to AF, major

extracranial hemorrhage, and intracerebral hemorrhage, as well as the choice of treatment. Chance events include thromboembolism and major bleeding events (intracerebral hemorrhage, subdural hematoma, or non-central nervous system bleeding). After both types of events, patients face death, permanent symptoms (severe or mild), or resolution of symptoms. Finally, patients may die from non-explicitly modeled causes (for example, demographic characteristics; age, gender, or race; or excess risk for death following stroke or intracerebral hemorrhage). At the end of each monthly cycle, there is a new distribution across the health states shown at the Markov node that reflects the effect of the initial intervention and outcomes of subsequent chance events.

Scoring Details for CHA_2DS_2VASc

Ischemic stroke risk in patients with nonvalvular atrial fibrillation can be quantified by the CHA_2DS_2VASc scoring algorithm.(32) CHA_2DS_2VASc assigns 1 point for each of the following risk factors: **C**ongestive heart failure, **H**ypertension, **A**ge 65 - 74, **D**iabetes, **V**ascular disease (prior myocardial infarction, peripheral arterial disease, or aortic plaque), and female **S**ex **c**ategory (Appendix Table 1). Two points are assigned for a history of **S**troke or transient ischemic attack, and **A**ge ≥ 75 years.

Scoring Details for HAS-BLED

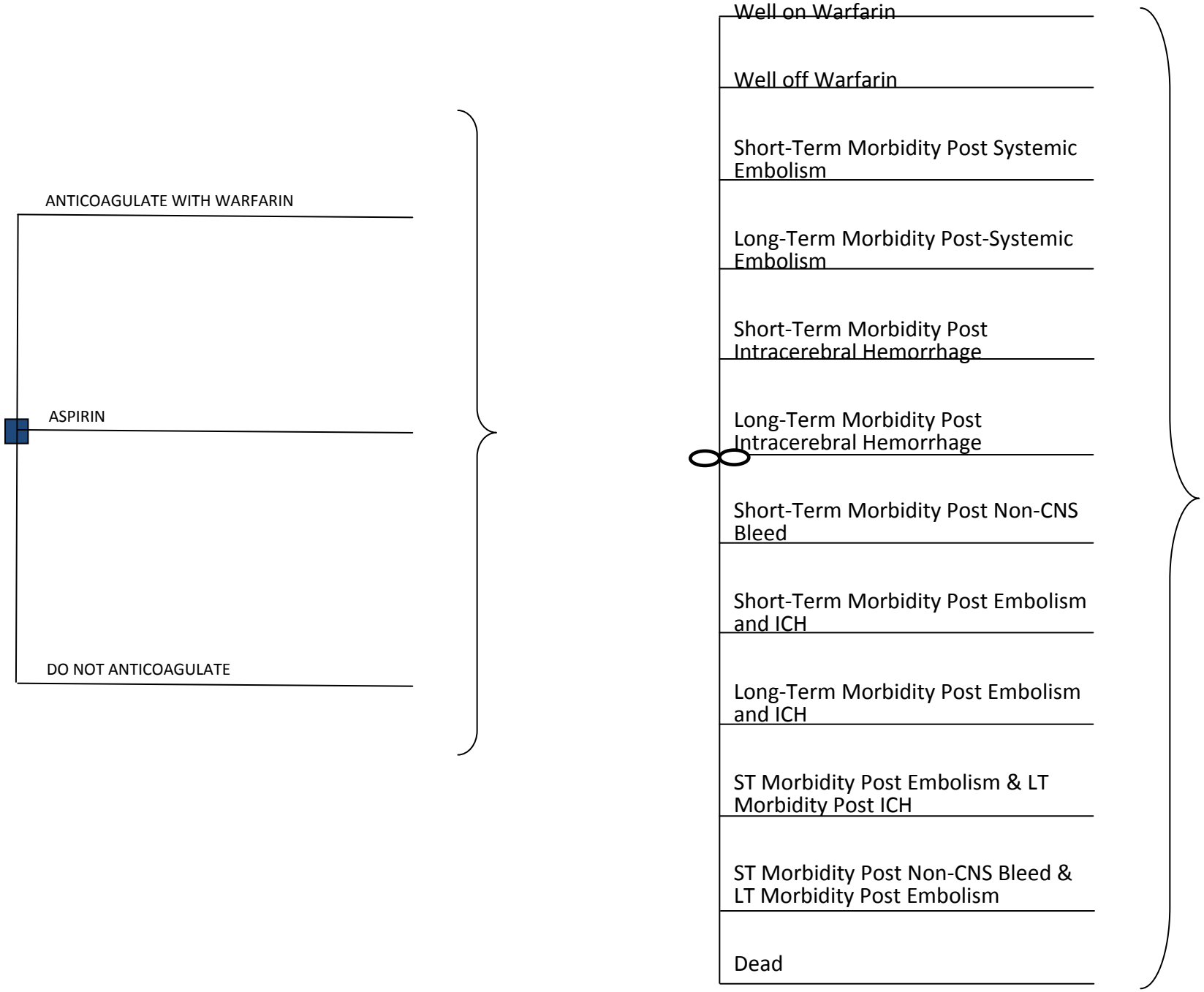
Risk of major bleeding in patients with nonvalvular atrial fibrillation receiving treatment with warfarin can be quantified by the HAS-BLED scoring algorithm.(15) HAS-BLED assigns 1 point for each of the following risk factors: poorly controlled **H**ypertension (systolic blood pressure ≥ 160 mmHg), **A**bnormal renal or liver function (one point each – renal transplantation or dialysis, or serum creatinine ≥ 2.26 mg/dl or 200 umol/L; chronic hepatitis or biochemical evidence of significant hepatic derangement – bilirubin > 2 x upper limit of normal in conjunction with AST/ALT > 3 x upper limit of normal), **S**troke history, **B**leeding history (history of previous bleed or predisposition to bleeding, **L**abile INR (time in therapeutic range < 60%), **E**lderly (age ≥ 65), **D**rugs or alcohol (one point each – alcohol abuse, or concomitant use of antiplatelet or non-steroidal anti-inflammatory drugs).

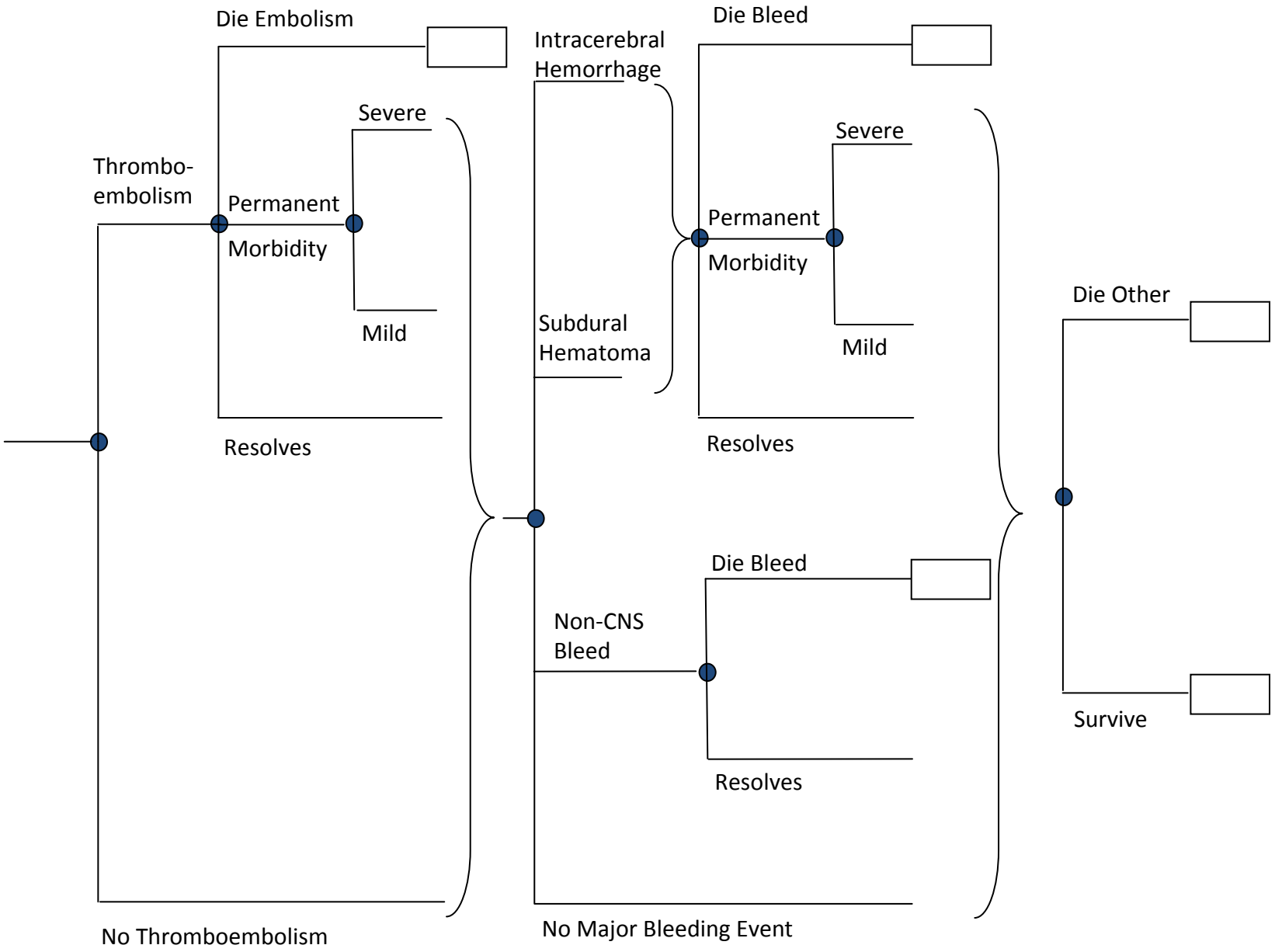
Appendix Table 1. Annual Rate of Ischemic Stroke based on CHA_2DS_2VASc Score.

CHA_2DS_2VASc Score (32)	Annual rate of ischemic stroke (%/year)
0	0.66
1	1.45
2	2.92
3	4.28
4	6.46
5	9.97
6	12.52
7	13.96
8	14.10
9	15.89

Appendix Table 2. Annual Rate of Major Bleeding while receiving warfarin based on HAS-BLED Score.

HAS-BLED Score (15)	Annual rate of major bleeding (%/year)
0	0
1	0.7
2	1.9
3	2.4
4	3.4
5	5.7
6	15.5


ANTICOAGULATE WITH WARFARIN
ASPIRIN
DO NOT ANTICOAGULATE
Well on Warfarin
Well off Warfarin
Short-Term Morbidity Post Systemic Embolism
Long-Term Morbidity Post-Systemic Embolism
Short-Term Morbidity Post Intracerebral Hemorrhage
Long-Term Morbidity Post Intracerebral Hemorrhage
Short-Term Morbidity Post Non-CNS Bleed
Short-Term Morbidity Post Embolism and ICH
Long-Term Morbidity Post Embolism and ICH
ST Morbidity Post Embolism & LT Morbidity Post ICH
ST Morbidity Post Non-CNS Bleed & LT Morbidity Post Embolism
Dead


Die Embolism
Thrombo-
embolism
Permanent
Morbidity
Severe
Mild
Resolves
No Thromboembolism
Intracerebral
Hemorrhage
Subdural
Hematoma
Die Bleed
Permanent
Morbidity
Severe
Mild
Resolves
Non-CNS
Bleed
Die Bleed
Resolves
No Major Bleeding Event
Die Other
Survive


atrial
fibrillation
guideline support tool

Draft 6
Author: Mark Eckman, MD
Booklet design: Ruth Wise, MDes
Katie Staun, MDes

Atrial Fibrillation Guideline Support Tool

This tool will help your doctor, pharmacist, or nurse include your opinions and preferences for health outcomes in decisions about the treatment of your atrial fibrillation. Part of this treatment may include taking blood-thinning medication.

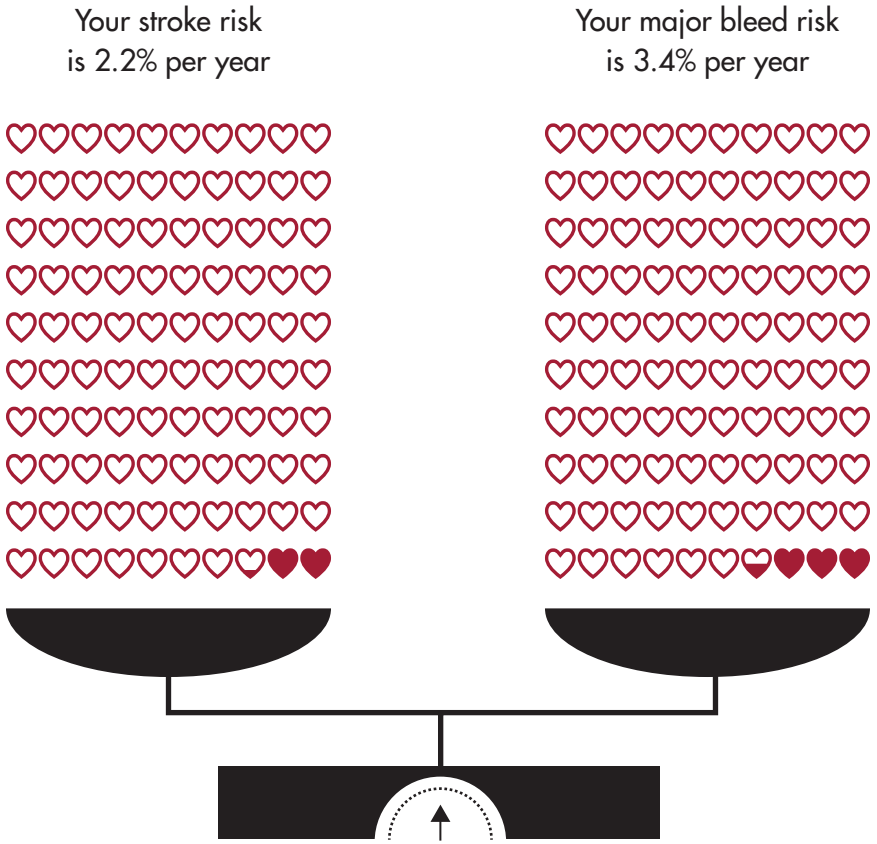
Introduction to Atrial Fibrillation Guideline Support Tool

Blood-thinning medicine helps prevent stroke, a possible complication of atrial fibrillation. It can also cause internal bleeding, such as bleeding from your stomach. Therefore, it is important for us to ask you how you feel about these risks.

This shared decision-making tool also considers your personalized risk of stroke due to atrial fibrillation and your risk of bleeding while receiving blood-thinning treatment.

Your Personalized Risks*

To help you weigh these risks, your personalized risk of stroke without blood thinning treatment and your risk of major bleeding while taking blood thinning treatment are shown below.



These risks also increase every year as you age.

*Primary Care Provider: CHA_2DS_2VASc = 2 and HAS-BLED = 4 for this patient.

Instructions for Using Atrial Fibrillation Guideline Support Tool: Utility Assessments

In order to personalize your treatment guidelines for blood-thinning therapy, we want to know your opinions about:

- Bleeding from the stomach, which might occur from blood-thinning treatment & only bothers you for a short period of time

- Stroke with severe life-long symptoms (that occurs because of atrial fibrillation)

Adapted from: Devereaux et. al. British Medical Journal; 2001;323, 1-7.

Scenario Descriptions for Health Outcomes

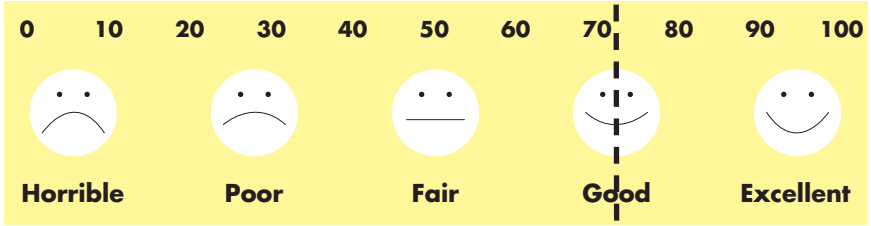
	Major Bleeding While Taking Blood Thinning Treatment (gastrointestinal bleeding)	Severe Stroke
Physical Symptoms	• You notice dark black colored bowel movements for a couple of weeks. • Then, you feel unwell for several days and suddenly vomit blood.	• You suddenly cannot move or feel your arm and leg on one side of your body. • You have difficulty eating and swallowing without choking. • You cannot talk.
Mental Symptoms		• You have trouble expressing yourself. • You can't understand what is being said.
Treatment	• You are admitted to the hospital. • You stop taking your blood thinner (eg., coumadin, aspirin, clopidogrel). • A tube is put down your throat to see where the bleeding is coming from. • You do not need an operation. • You receive blood transfusions to replace the blood you lost.	• You are admitted to the hospital. • The nurses feed you. • You cannot dress yourself. • You cannot walk.
Recovery	• You stay in the hospital for five days. • You feel well once you return home. • You need to take acid blocking medication for 6 months to prevent further bleeding. • You stop taking your blood thinning treatment for several months. • After some time you are completely back to normal.	• You are transferred from the hospital to a rehabilitation facility. • After one month of physical therapy you are able to wiggle your toes and lift your arm off the bed. • You need help to do most of your daily activities, including eating, washing up, and going to the bathroom. • You remain this way for the rest of your life.

Your Values for: Major Bleeding While Taking Blood Thinning Treatment

Imagine you have had a **major bleed**. Your quality of life is affected by your physical symptoms, your worry, and how these prevent you from doing the things you enjoy and even your usual daily activities.

Major Bleeding While Taking Blood Thinning Treatment (gastrointestinal bleeding)	
Physical Symptoms	• You notice dark black colored bowel movements for a couple of weeks. • Then, you feel unwell for several days and suddenly vomit blood.
Treatment	• You are admitted to the hospital. • You stop taking your blood thinner (eg., coumadin, aspirin, clopidogrel). • A tube is put down your throat to see where the bleeding is coming from. • You do not need an operation. • You receive blood transfusions to replace the blood you lost.
Recovery	• You stay in the hospital for five days. • You feel well once you return home. • You need to take acid blocking medication for 6 months to prevent further bleeding. • You stop taking your blood thinning treatment for several months. • After some time you are completely back to normal.

This scale rates your quality of life following a **major bleed**. For example, if you feel that your quality of life would be good while experiencing the symptoms, treatment and recovery of a major bleed, draw a line through or near the good symbol.



Quality of Life - Gastrointestinal Bleed

Draw a line below showing your quality of life with a major bleed.

Quality of Life - Gastrointestinal Bleed

Your Values for: Severe Stroke

Imagine you have had a **severe stroke**. Your quality of life is affected by your physical symptoms, your worry, and how these prevent you from doing the things you enjoy and even your usual daily activities.

Make-believe there is a new pill that will cure you of all your **severe stroke** symptoms.

You only need to take **one** pill from a bottle with 100. However, the bottle also has a certain number of pills which result in sudden but painless death in your sleep.

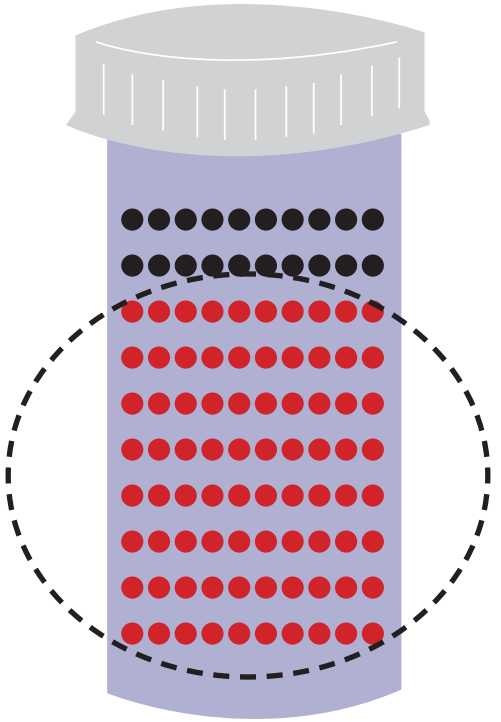
Given everything you know about how a **severe stroke** would affect your quality of life and your ability to do the things that are important to you, we want to know what you think about this pill.

Severe Stroke	
Physical Symptoms	• You suddenly cannot move or feel your arm and leg on one side of your body. • You have difficulty eating and swallowing without choking. • You cannot talk.
Mental Symptoms	• You have trouble expressing yourself. • You can't understand what is being said.
Treatment	• You are admitted to the hospital. • The nurses feed you. • You cannot dress yourself. • You cannot walk.
Recovery	• You are transferred from the hospital to a rehabilitation facility. • After one month of physical therapy you are able to wiggle your toes and lift your arm off the bed. • You need help to do most of your daily activities, including eating, washing up, and going to the bathroom. • You remain this way for the rest of your life.

CHOOSE

Live with symptoms and disability following a **severe stroke**.

or, take **one** pill from this bottle that will cure you and relieve your stroke symptoms.



However, a certain number of pills in this bottle of 100 pills will cause a fatal reaction.

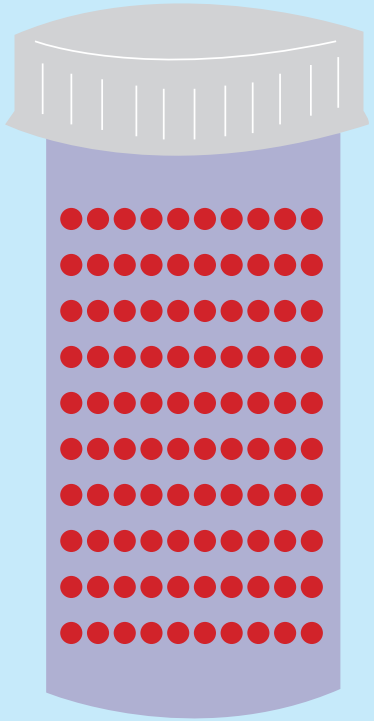
How much of a risk would you be willing to take?

- For instance, if there were 80 "poison pills" (the circled red pills) in the bottle, would you be willing to take an 80% chance on getting a pill that would kill you and a 20% chance of getting a pill that would cure you?

CHOOSE

Live with symptoms and disability following a **severe stroke**.

or, take **one** pill from this bottle that will cure you and relieve your stroke symptoms.



Draw a circle around the pills to show the largest number of "poison pills" you would tolerate being in this bottle and still be willing to take a chance on the medicine.

Line 1. Write down the number of "poison pills" you circled: _____.

Line 2. Now subtract the number in line 1 from 100 to get the number of "cure pills" in this bottle: _____.

Instructions for Using Atrial Fibrillation Guideline Support Tool

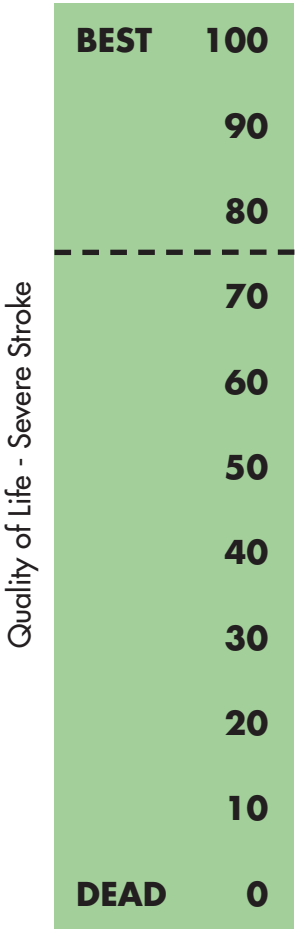
The figure below is a scale for the quality of life following a **severe stroke**. Some people also call this scale a "feeling thermometer."

- Best is at the top of the scale and has a value of 100.
- Dead is at the bottom of the scale and has a value of 0.

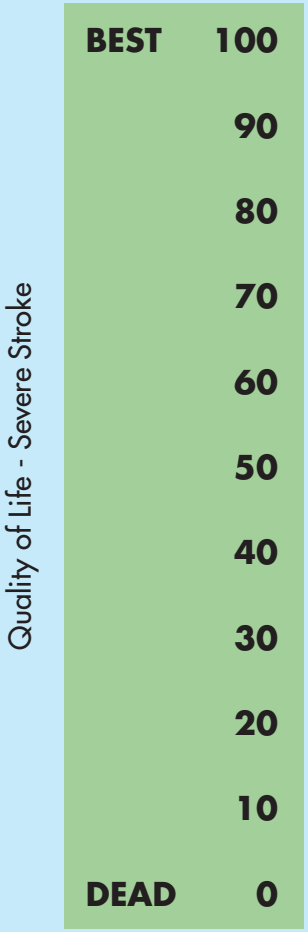
We can find out how important quality of life is for you following a **severe stroke**, based on how many poison pills you are comfortable with being in the bottle of 100.

- For example, if you would only take **one** pill from a bottle that has 25 poison pills and 75 cure pills:

  Your quality of life with a severe stroke would be 75 on a scale of zero to 100 (see the dashed line in the figure on the right).



Draw a line on the figure below showing your quality of life with a severe stroke. Remember, this should be the same as the number of cure pills (line 2, page 13) in the medicine bottle.

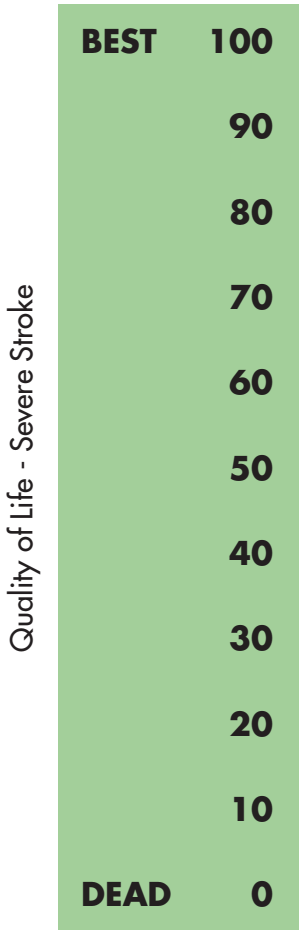


Instructions for Using Atrial Fibrillation Guideline Support Tool

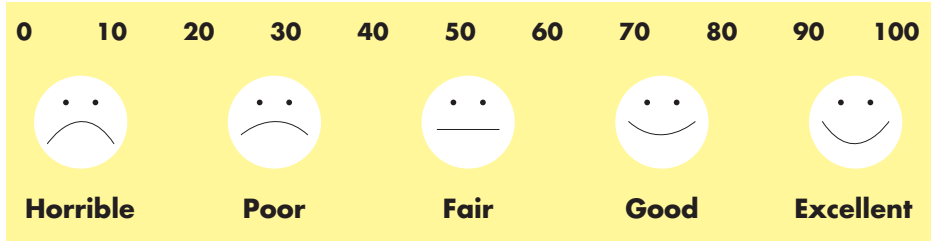
This figure will help us decide whether your health state preferences suggest that aspirin or anticoagulation with warfarin is the best blood thinning treatment for your condition.

The figure contains two quality of life scales like you just saw:

- a scale for quality of life following a **severe stroke**



- a scale for quality of life during the immediate time of a **major stomach or intestinal (gastrointestinal) bleed**



Quality of Life - Gastrointestinal Bleed

CHA_2DS_2VASc = 2; HAS-BLED = 2
Stroke risk: 2.2%/year; Major Bleed Risk: 1.9%/year

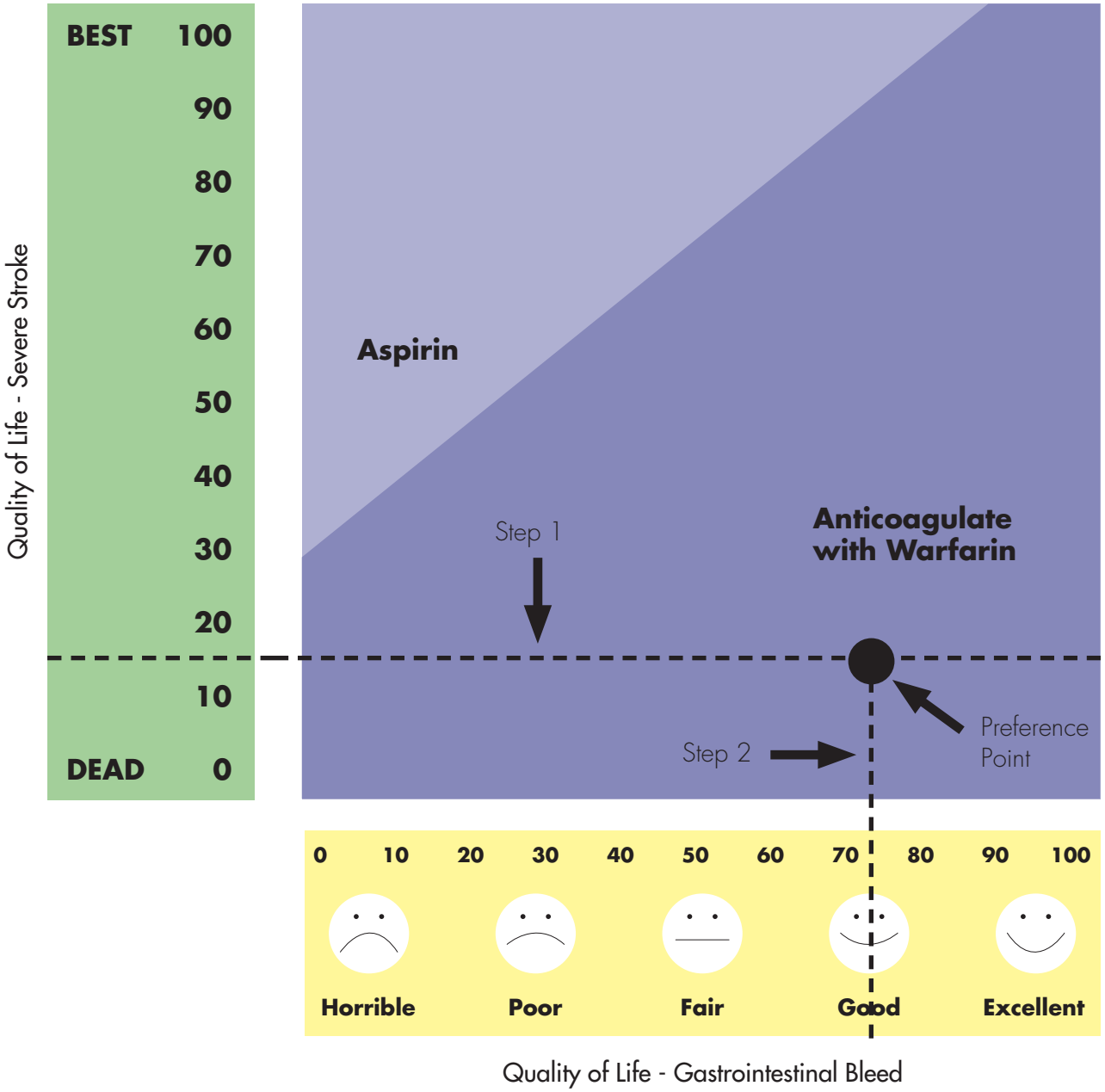
Instructions for Using Atrial Fibrillation Guideline Support Tool

CHA_2DS_2VASc = 2; HAS-BLED = 2
Stroke risk: 2.2%/year; Major Bleed Risk: 1.9%/year

Example A

The instructions on this page apply to the next two spreads.

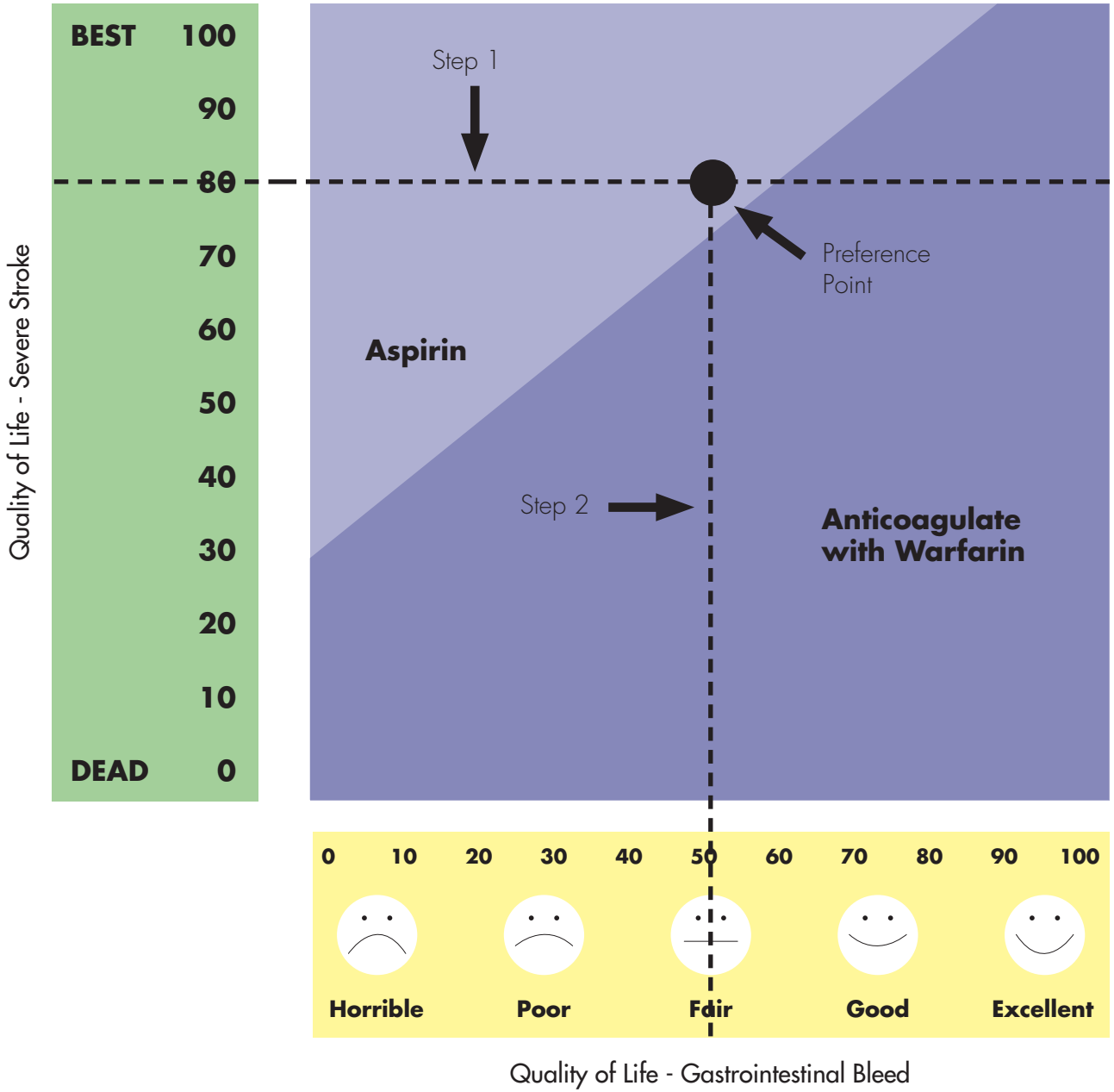
- Step 1: Mark on the scale, to the left of the figure, your quality of life for **severe stroke**. If, for instance, you would only take a pill if there were no more than 85 poison pills and at least 15 cure pills in the medicine bottle, then your quality of life would be 15 on the scale.
- Step 2: Mark on the scale, at the bottom of the figure, your quality of life for a **gastrointestinal bleed** (bleeding from your stomach) that causes no long-term symptoms. In this example, you put gastrointestinal bleed at "good" on the feeling thermometer.
- Look at the figure to see where these marks meet. This is your preference point.
- The spot where your preference point falls on the figure tells you which treatment may be best for you: Aspirin or Anticoagulation with Warfarin which in this case is **Anticoagulation with Warfarin**.



Instructions for Using Atrial Fibrillation Guideline Support Tool

Example B

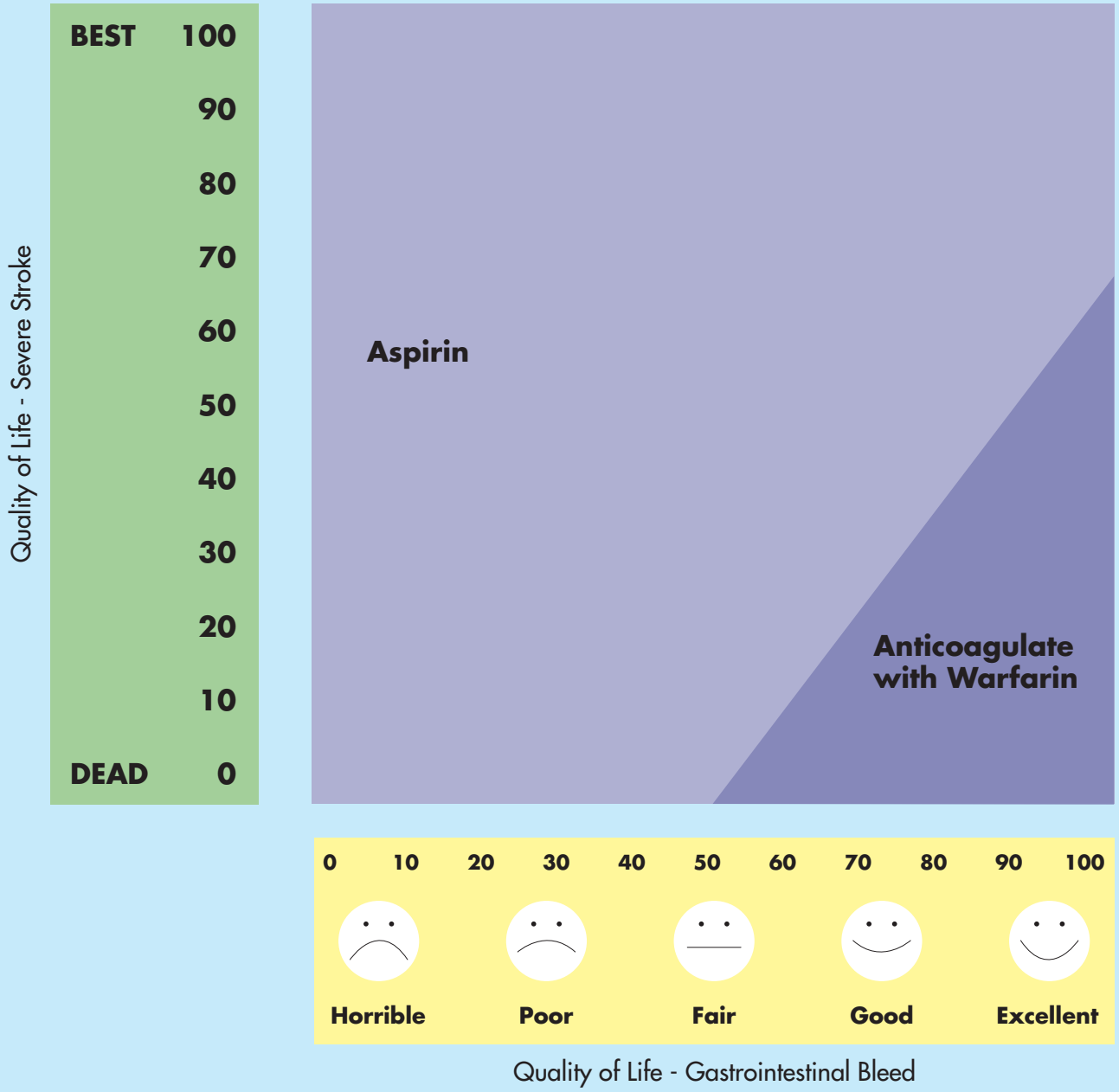
- Step 1: Mark on the scale, to the left of the figure, your quality of life for **severe stroke**. If, for instance, you would only take a pill if there were no more than 20 poison pills and at least 80 cure pills in the medicine bottle, then your quality of life would be 80 on the scale.
- Step 2: Mark on the scale, at the bottom of the figure, your quality of life for a **gastrointestinal bleed** (bleeding from your stomach) that causes no long-term symptoms. In this example, you put gastrointestinal bleed at "fair" on the feeling thermometer.
- Look at the figure to see where these marks meet. This is your preference point.
- The spot where your preference point falls on the figure tells you which treatment may be best for you: Aspirin or Anticoagulation with Warfarin which in this case is **Aspirin**.



Instructions for Using Atrial Fibrillation Guideline Support Tool

Your Turn!

- Step 1: Mark on the scale, to the left of the figure, your quality of life for **severe stroke** (you can remind yourself by looking at the mark you made on the quality of life scale on **page 15**).
- Step 2: Mark on the scale, at the bottom of the figure, your quality of life for a **gastrointestinal bleed** (bleeding from your stomach) that causes no long-term symptoms (you can remind yourself by looking at the mark you made on the quality of life scale on **page 9**).
- Look at the figure to see where these marks meet. This is your preference point.
- The spot where your preference point falls on the figure tells you which treatment may be best for you: Aspirin or Anticoagulation with Warfarin.



Notes or questions to discuss with your clinician

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