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Framingham Risk Scores and "What-If?" Scenarios
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The Framingham Study which began in 1949 is the longest running longitudinal health risk study ever undertaken. "Longitudinal" means that the same subjects are included at all stages of the study. There are weaknesses to the study. Often the Cardiovascular Risk calculators overestimate a person's health risk and because total cholesterol was the principle lipid element measured when the study was started, the data does not assess the risk of Low Density Lipoproteins (LDL, which is the "bad cholesterol)." We now know that controlling your LDL is the most important issue related to lipids and health risk.

Why do we use Framingham Heart Study Risk Calculators?

Even though these risk calculators are not perfect, they are still the best we have. And, it is imperative that you know and that your provider knows what your risk is, because it is with the knowledge of your risk that a plan of care and a treatment plan can be designed to help you preserve your health.

Remember, "risk" is an attempt to determine what the future might be like which means it is imprecise. Some people with a high risk will not experience poor health and some who have low risk will. Overall, however, those with high risk will have more heart attacks and strokes than those with low risk.

Dynamic Complexity

The problem with biological systems is that change, even change which results in deterioration of your health, does not occur quickly and it often occurs without any signs or symptoms until the illness, or disease process has already caused significant damage. There is no explanation of this principle more apt to our use of "risk calculators" than Peter Senge's explanation of "dynamic complexity" in *The Fifth Discipline*.

Senge defines "dynamic complexity" as a situation "where cause and effect are subtle, and where the effects over time of interventions are not obvious." This perfectly describes the development of many disease states and the benefit of their treatment. We know that obesity causes, or contributes to most diseases including type 2 diabetes, hypertension, heart disease, cancer, etc. In these conditions, "obesity" is the cause; "cancer" is the effect, but the change is slow and is not apparent. Also, the results of treatment are very slow. Consequently, it is hard to sustain the changes necessary to eliminate the "cause," which is obesity, in order to avoid the "effect" which is cancer.

Shifting the Burden

There are structural problems which aggravate the obvious solutions to a business or a health problem; Senge addresses one of these and calls it "the shifting the burden." He defines "shifting the burden," as "an underlying problem generates symptoms that demand attention. But the underlying problem is difficult for people to address, either because it is obscure or costly to confront. So people 'shift the burden' of their problem to other solutions – well intentioned, easy fixes which seem extremely efficient. Unfortunately, the easier 'solutions' only ameliorate the symptoms; they leave the underlying problem unaltered. The underlying problem grows worse, unnoticed because the symptoms apparently clear up, and the system loses whatever ability it had to solve the underlying problem."

This happens in healthcare when a person looks to healthcare providers or medications to solve a problem which can only be solved by their own habits, choices, decisions and resolution. A pill, or a procedure, or a prescription is sought in order to overcome the "obesity." It will work for a short while but not long term. When it fails, more aggressive interventions are tried without addressing the fundamental problem.

The Quick Fix Deception

Senge's business prescription is a good one for healthcare, also. He says, "Beware the symptomatic solution…that address only the symptoms…not fundamental causes, tend to have short-term benefits at best. In the long term, the problem resurfaces and there is increased pressure for symptomatic response. Meanwhile, the capability for fundamental solutions can atrophy." (p. 104) Senge adds, "The 'easy solution…the 'quick fix'…solves the problem temporarily….(but) a shifting of burden structure lurks behind many 'solutions (and) explains a wide range of behaviors where well-intentioned 'solutions' actually makes matters worse over the long term." (p. 107)

Senge and Medicine

The longer a person delays addressing the "real" cause of their problem, the fewer options and the fewer resources they have for dealing with the "real" cause of the problem. For instance, the longer a person fails to exercise, often resulting in gaining weight and diminishing heart function, the more difficult effective solutions will be once a person determines to improve their health. If a person continues to "shift the burden" of their own irresponsibility to another, expecting an artificial solution to relieve the burden created by the rejection of the real solution, they will never achieve their goal. In this case, the harder the patient pushes for solutions from a healthcare system which cannot solve their problem, for which a natural and obvious solution exists, the less benefit the patient will achieve. It is possible to ignore the real solutions – i.e., activity such as walking – until the knees and other joints have deteriorated and it is not possible to become active. In that case, more and more pressure is placed on the artificial system with less and less satisfaction with the results.

Risk Calculators: Dynamic Complexity and Shifting the Burden

These are the reasons for our using "risk calculators." Because in a biological system proving the benefit of fundamental solutions by waiting for the negative consequences of poor health

choices is not acceptable, we use "risk calculators" to project what those poor choices will lead to. Hopefully, those risk calculators will help you make a decision to make a change. The American Academy of Family Practice (AAFP) recommends that a healthcare provider calculate these risk factors every five years for their patients. By accessing http://www.jameslhollymd.com/Cardiovascular_Risk_Calculators_by_Alan_E_Leifeste.cfm, you will be able to read Dr. Alan Leifeste's letter to the AAFP about SETMA's use of Framingham Risk Calculators.

More Information Found at www.jameslhollymd.com

The details of each of the risk calculators including the elements of your health used in calculating each score can be found on SETMA's website (www.jameslhollymd.com) under "Electronic Patient Management Tools" by clicking on "Framingham Cardiovascular Risk" and then accessing "Framingham Cardiovascular and Stroke Risk Assessment Tutorial." In addition, at our website under "Your Life Your Health", twenty-two articles can be found under "View Articles by Subject" and accessing "Cardiovascular Disease Risk Factors."

What If?

Because it takes SETMA only one second (really) to calculate all twelve risk calculators, we thought we were doing great. However, when we showed this function to our new colleagues from Joslin Diabetes Center, Dr. Richard Jackson commented that these scores overstate the risk and Dr. Kenneth Snow asked if we could show the patient how their risk would be affected if they make a change in their habits? Sadly, we had to admit that we could not. That was on Tuesday November 30, 2010.

We realized that while the patient has to know their risk, to understand "dynamic complexity" and its dangers for their ignoring their health until it is too late, and to avoid "shifting the burden" of responsibility from themselves to another, their healthcare providers have a responsibility to show them that if "they make a change that it will make a difference."

In responding to Drs. Jackson and Snow's questions, SETMA has built a "What-If" scenario into our display of the Framingham Cardiovascular and Cerebrovascular Risk Score calculations. In the following screen shot, you will see the Risk Calculator Results for a patient with the following information:

- Age 45
- Sex M
- BMI 30
- Weight 210
- Height 70 inches
- Cholesterol 210
- HDL 30
- Blood Press 166/96
- Diabetes Yes

- Smoker No
- HgbA1c 8.5

The General Cardiovascular Disease 10-Year risk

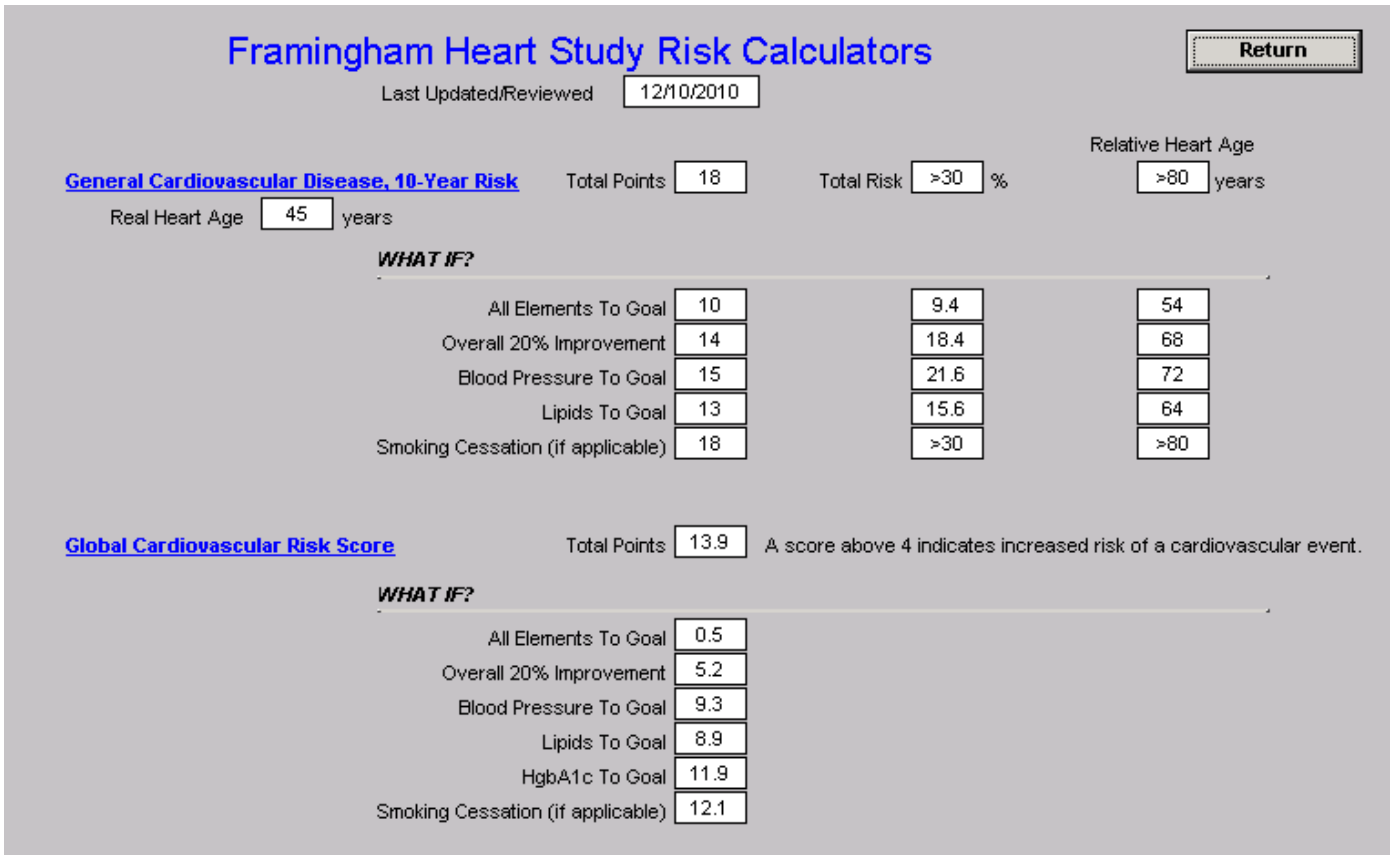
This score projects the probability of a person having a major cardiovascular event such as a heart attack or stroke in the next ten years. Once again, the elements used in this calculation can be found as indicated above. This patient's "real heart age" is 45 but the "relative heart age" is 80 and the 10 year risk is high at 30%. These are very discouraging number for a 45 year old man. But now that we have added the "What If?" section, we can assure this man that if he will make a change, it will make a difference. In addition, the greatest opportunity for improvement in his risk is indicated by the change in risk with each of the elements below.

- If he changes all of the elements in this calculation which are changeable (systolic blood pressure, cholesterol, smoking, hypertension treatment), his risk will improve. The unchangeable features are age, gender and diabetes.

- If he changes all of the elements to "evidenced-based" goals, his risk will drop to 9.4% and his "relative heart age" will drop from 80 to 54. These are dramatic improvements in his risk. We can say categorically to him, "if he makes a change, it will make a difference."

- If he changes all of the elements by a 20% improvement, his risk will drop to 18.4% and his "relative heart age" will drop to 68. Obviously these are not as good as the result of treating him to goal, but they are significantly improved.

- The changes for treating his blood pressure to goal without affecting the other elements shows a drop in risk as does changing the cholesterol. There is no improvement for smoking cessation in that it is noted that this patient does not smoke.



Framingham Heart Study Risk Calculators

Return

Last Updated/Reviewed 12/10/2010

General Cardiovascular Disease, 10-Year Risk — Total Points 18 — Total Risk >30 % — Relative Heart Age >80 years

Real Heart Age 45 years

WHAT IF?

All Elements To Goal	10	9.4	54
Overall 20% Improvement	14	18.4	68
Blood Pressure To Goal	15	21.6	72
Lipids To Goal	13	15.6	64
Smoking Cessation (if applicable)	18	>30	>80

Global Cardiovascular Risk Score — Total Points 13.9 — A score above 4 indicates increased risk of a cardiovascular event.

WHAT IF?

All Elements To Goal	0.5
Overall 20% Improvement	5.2
Blood Pressure To Goal	9.3
Lipids To Goal	8.9
HgbA1c To Goal	11.9
Smoking Cessation (if applicable)	12.1

The second risk score above, the Global Cardiovascular Risk Score, which is technically not a Framingham Calculator, was derived from the Framingham Data. It was developed in order to eliminate the unchangeable features such as gender and age which are so heavily weighted in the Framingham Calculators so that many young people with significant risk are overlooked and many elderly people with lower risk are still rated at a very high risk.

The elements in this score are HDL, Systolic Blood Pressure, HbA_{1C}, packs per day smoking and total cholesterol. As can be seen, if all of these elements are treated to goal, the risk goes from 13.9 points to 0.5 points. It is possible to get some indication of the contribution of each element to the risk by seeing how the risk changes when only one of the elements is changed such as blood pressure, lipids, or HbA_{1C}. As is suggested by this review, the most important thing to control is your blood pressure.

Stroke Risk – What IF?

The final calculator for which the "What If?" scenarios have been calculated is "stroke risk," which is shown on the template below. The elements of this calculator are:

- Age 55-84
- Systolic blood pressure
- Diabetes mellitus
- Cigarette smoking,

- Prior cardiovascular disease (CHF, MI, Peripheral Vascular Disease, Angina)
- Atrial fibrillation
- Left ventricular hypertrophy
- Use of hypertensive medication

The current calculation of 16% risk is shown and the improvement with each scenario is displayed. Of interest is that simply controlling the blood pressure achieves almost all the possible improvement, i.e., from 16% to 5%. And, there is no difference between a "20% improvement" and "a treatment to goal," demonstrating that it is not necessary to be perfect in order to achieve significant improvement; said another way, "If you make a change – even a small change -- it will make a difference."

Plan of Care and Treatment Plan

If you are going to make a change which will make a difference, there must be a basis on which that change can be expected. We know that conversations at the time of an office visit are part of that decision to make a change. However, without a written, personalized plan of care and treatment plan, few will successfully make those changes and sustain them.

The “WHAT-IF?” scenarios described above will be added to your diabetes, hypertension and/or lipid plan of care and treatment plan. This document is the “baton” which is passed from one member of your healthcare team – your healthcare provider – to another member of your healthcare team – yourself. If you will study it, we believe it will encourage you to make a change and it is our confidence that it will make a difference.