Incorporating patient preference information into the Medical Device Total Product Life Cycle (TPLC) regulatory paradigm

September 19, 2013
Patient Preference Initiative Workshop

MDIC Overview
September 19, 2013

Bill Murray
President & CEO
Medical Device Innovation Consortium
Agenda

• **Background:**
  • CDRH Vision
  • Regulatory Science Definition and Role

• **Overview: Medical Device Innovation Consortium**
  • What is it?
  • Why is it Important?
  • History and Progress
  • How it is being Implemented
  • Initial Projects

• **How to Get Involved**
• **Patients** in the U.S. have access to high-quality, safe, and effective medical devices of public health importance first in the world.

• The U.S. is the world’s leader in regulatory science, medical device innovation and manufacturing, and radiation-emitting product safety.

• U.S. post-market surveillance quickly identifies poorly performing devices, accurately characterizes real-world performance, and facilitates device approval or clearance.

• Devices are legally marketed in the U.S. and remain safe, effective, and of high-quality.

• **Consumers, patients, their caregivers, and providers** have access to understandable science-based information about medical devices and use this information to make health care decisions.
What is Regulatory Science?

• Provides the tools, standards, and approaches needed to evaluate the safety, effectiveness, performance, and quality of medical products

• Benefits patients by speeding the rate of important technologies reaching market

• Reduces time and resources needed for device development, assessment, and review. For example:
  • Can lead to quicker, more efficient device approvals
  • Can decrease the size and duration of pre-market clinical trials

Faster, Cheaper, Safer
Challenges

• Limited federal government investment in regulatory science

• Private sector investments generally have been proprietary

• High cost of engaging in scientific collaborations due to administrative inefficiencies and legal issues

• Risk of legal liability when competitors collaborate

Solution: Establish a public-private partnership
A unique place where Government, Industry and non-profits can collaborate to improve health by making positive changes in patient access to innovative medical device technologies while enhancing safety and efficacy
MDIC: What is it?

• MDIC is a unique public-private partnership that enables pre-competitive collaboration between medical technology stakeholders
  – Modeled after the Biomarkers Consortium
  – Strong involvement by FDA in its creation
  – It is a 501 (C)3 organization that enables FDA to participate in areas of common interest
  – Brings together the expertise and resources of industry, government and non-profit organizations
  – Facilitates projects based on member identified common areas of need to enable “faster, safer and more cost effective” access to innovative medical devices
FDA pledges support for med tech initiative

The FDA has announced a new nonprofit public-private partnership to speed up medical device development. The Medical Device Innovation Consortium (MDIC) is a public-private partnership to speed up the development of new medical technology. The agency said it hopes to offer guidance to the Medical Device Innovation Consortium, a new industry-backed group that aims to simplify the design and testing of medical devices.

The agency's pledge follows criticism from device industry advocates, who have long been critical of the FDA review process, which they say is convoluted, slow, and unpredictable. As a result, the process takes half the time in Europe first where the process takes half the time.

"This can best be done by making sure we're applying the best science to the task and bringing together the best minds, no matter where they are found," Hamburg said, in a teleconference with reporters.

The agency's pledge follows criticism from device industry advocates, who have long been critical of the FDA review process, which they say is forcing some companies out of business.
MDIC: Why is it Important?

• Provides an organization construct to enable collaboration and process improvement that can not be accomplished on a company specific or product specific basis
• Provides the tools, standards, and approaches needed to keep pace with the rate of technology advances
• Benefits patients by speeding the rate of important technologies reaching the market
• Reduces time and resources needed for device development, assessment, and review
Key Focus

Medical Device Industry
The MDIC is the only public-private partnership (PPP) focused exclusively on the strategic needs of the medical device industry. The MDIC is designed to create a collaborative environment where the industry, non-profit organizations, and government can work together to advance pre-competitive medical device research so that the medical device community can keep pace with the needs of the patients in the United States in a more timely manner.

Regulatory Science
Regulatory science refers to the development and evaluation of new tools, standards and approaches that support a more efficient and effective evaluation of innovative new technologies

Serving Patients and Improving Health
The MDIC has been formed to add value at the intersecting needs of the medical device industry, the FDA, CMS, and the related organizations that are together responsible for a vibrant medical device industry that serves the public health needs of the U.S.
MDIC Value Proposition
(Improving the Total Product Life Cycle)

- **For Regulators:** to develop a significant understanding of state of the art medical device regulatory science to support regulatory decision making
- **For Industry:** to increase the regulatory science knowledge base, informed with input from regulators, to influence development of industry standards and facilitate more cost effective and efficient development of new devices and diagnostics
- **For Academics:** to increase utilization of academic resources for training and research
- **For Patients:** to promote and support the development of safe and effective device therapies and enjoy first in the world access
- **For Providers:** to promote public health through effective collaboration and access to state of the art technology
Medical Device Development

The Total Product Life Cycle

Faster, Safer, More Cost Effective
MDIC Strategies

CREATE A FORUM FOR COLLABORATION AND DIALOGUE

- Establish a transparent and flexible governance structure
- Ensure involvement from regulators, manufacturers, and other appropriate stakeholders
- Implement appropriate intellectual property and data sharing policies

MAKE STRATEGIC INVESTMENTS IN REGULATORY SCIENCE

- Establish working groups to identify and prioritize key issues
- Develop procedures for requesting and evaluating project proposals and for selecting centers to conduct the research
- Invest in programs aimed at improving the throughput of innovation

PROVIDE TOOLS TO DRIVE INNOVATION

- Provide education about the medical device regulatory process and new tools, standards and test methods
- Develop searchable databases and links to relevant reports and methods
- Hold an annual medical device regulatory science symposium
MDIC Scope and Activities

Medical Device Discovery and Development Path

1. Basic Research
2. Proof of Concept or Invention
3. Early-stage Technology Development
4. Product Development
5. Production and Marketing

Key:
- Solid arrow: Source frequently funds this technological stage
- Dashed arrow: Source occasionally funds this technological stage

Precompetitive Space: Standards, data and processes that are common across an industry

Competitive Space: Data, processes and know-how specific to a product

Regulatory science develops tools, methods, and standards to aid in this step

Reduce time and cost of device development and review

People

Intellectual Capital

Resources

FDA

MDIC

Non-Profit
- Patients
- Providers
- Academia

Industry
Memorandum of Understanding (MOU) submitted December 2011

Business plan created October 2012

Articles of Incorporation filed August 2012

MDIC at LSA Conference December 5 2012

MDIC website launched Nov 12 2012

Convene First meeting of the full Board
Approve Bylaws; approve Budget & administrative structure, confirm initial work priorities Feb 26, 2013

MDIC Nationwide rollout Washington, D.C. December 2012

Respond to Membership Requests December 2012

Convene Second meeting of the full Board. Gain approval of scoped projects May 28, 2013

Convene Third meeting of the full Board. Review project structure & plans. Sept 12, 2013
Initial Projects

• **Patient Centeredness & Benefit/Risk Management**
  Board Champion: Ross Jaffe, MD | Versant Ventures
  Managing Director
  Director, National Venture Capital Association

• **Computational Modeling and Simulation**
  Board Champion: Randy Schiestl | Boston Scientific
  VP, Global Operations and Technology

• **Clinical Trial Reform**
  Board Champion: Rick Kuntz, MD | Medtronic, Inc.
  Sr. VP and Chief Scientific, Clinical & Regulatory Officer
MDIC Board & Membership
Board of Directors

**Executive Committee**

Allan Coukell | The Pew Charitable Trusts
Director of Drugs and Medical Devices
MDIC Vice-Chair

Vincent Forlenza | Becton, Dickinson and Company
President, CEO and Chairman
MDIC Finance Committee, Vice-Chair

William A. Hawkins III | Immucor, Inc.
President and CEO
MDIC Board Chair

Michael R. Minogue | Abiomed, Inc.
President, CEO and Chairman
MDIC Secretary; Membership Committee Chair

William V. Murray | MDIC
President & CEO
Medical Device Innovation Consortium CEO

David Perez | Terumo BCT
President and CEO
Chairman, Blood Management Business Division, Terumo Corporation
MDIC Finance Committee Chair

Jeffrey Shuren, MD, JD | CDRH, FDA
Director, Center for Devices and Radiological Health
Food and Drug Administration
MDIC Membership Committee Vice-Chair

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Sr.VP and Chief Scientific, Clinical & Regulatory Officer

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Group President

Dale Wahlstrom | LifeScience Alley and The BioBusiness Alliance of MN
President & CEO

Tamara Syrek Jensen, J.D. | CMS
Deputy Director, Coverage and Analysis Group

Peter Saltonstall | NORD
President & CEO
Membership

- Membership and participation in the MDIC is open to representatives of organizations that are substantially involved in medical and/or medical device research, development, treatment, or education; the promotion of public health; or who have expertise in regulatory science.
- Membership is offered at several levels based on organization type and, if applicable, annual revenue.
- Membership has not been offered to academic groups
- Membership has not been offered to individuals
For the online webcast: Please submit your questions to the panel via the chat box. The online hosts will be collecting the questions during the session to be brought to the panel moderator during the panel discussion.
Is your clicker working?

A. Yes
B. No

93%
8%
Please identify your affiliation:

A. Patient/ Patient advocacy group
B. Professional Society
C. Research/ Academia
D. Provider/Clinician
E. Industry
F. Federal Agency

8% 12% 13% 10% 44% 13%
The Total Product Lifecycle
Where in the medical device total product lifecycle (TPLC) could you see patient preference information best utilized?

A. Discovery & ideation  
B. Invention & prototyping  
C. Pre-clinical  
D. Clinical trials  
E. Regulatory decision  
F. Product launch  
G. Post-market monitoring

[Bar chart showing percentages for each option]
From who is patient preference

A. Newly diagnosed patients
B. Patients who have exhausted their clinical options
C. Patients in the middle of their disease
D. Caregivers/Parents
E. General public
Who is best situated to collect patient preference information?

A. Academia
B. Industry
C. Clinicians
D. Patient Groups
E. Regulators

A: 14%  B: 29%  C: 16%  D: 30%  E: 10%
Where and how should patient preference information be communicated?

A. Decision-making conversation
B. Device labeling
C. Health communication
D. FDA Website
E. Other

30% 20% 26% 14% 10%
For the online webcast: Please submit your questions to the panel via the chat box. The online hosts will be collecting the questions during the session to be brought to the panel moderator during the panel discussion.
Quantifying Patients’ Benefit-Risk Tradeoff Preferences: Results from 6 Studies

F. Reed Johnson, PhD
Distinguished Fellow and Principal Economist
RTI Health Solutions
A Push to Spell Out a Drug’s Risks and Benefits
By NATASHA SINGER
Published: February 25, 2009

PROBLEMS FOR PAINKILLERS: THE OVERVIEW; F.D.A. ANNOUNCES STRONG WARNINGS FOR PAINKILLERS
By GARDINER HARRIS
Published: April 8, 2005

F.D.A. Panel Recommends M.S. Drug Despite Lethal Risk
By ANDREW POLLACK
Published: March 9, 2006

Review on Risks of Diabetes Drug
By HOLCOMB B. NOBLE
Published: February 23, 2000

F.D.A. to Review Safety of Popular Bone Drugs
By DUFF WILSON
Published: September 5, 2011

F.D.A. Issues New Alerts About Cholesterol Drugs
By GARDINER HARRIS
Published: February 29, 2012
When Do Benefits Outweigh the Risks?

Risks

Benefits
When Do Benefits Outweigh the Risks?

Risks

Benefits
When Do Benefits Outweigh the Risks?
When Do Benefits Outweigh the Risks?
When Do Benefits Outweigh the Risks?

Risks

Benefits
When Do Benefits Outweigh the Risks?
When Do Benefits Outweigh the Risks?
What is the appropriate role for patients’ values in weighing the benefits and risks of drugs or devices?

- **NONE**: Physicians are the best judge of what is best for patients

- **SOME**: Patient attitudes and concerns can influence health outcomes

- **MAJOR**: Patients experience both the benefits the harms of new treatment. Their values for both benefits and risks matter.
Assignment of weights to benefit and risk considerations… [involves] numerous judgments that are at best debatable and at worst arbitrary. FDA believes that this can be accomplished by a qualitative descriptive approach.
Risk tolerance will vary among patients, and this will affect individual patient decisions as to whether the risks are acceptable in exchange for a probable benefit. … FDA would consider evidence relating to patients’ perspective of what constitutes a meaningful benefit.

FDA (CDRH, CBER) Factors to Consider When Making Benefit-Risk Determinations in Medical Device Premarket Approval and De Novo Classifications, March 2012
### Example Trade-off Task
Severe Hand Eczema

<table>
<thead>
<tr>
<th>Medicine Feature</th>
<th>Medicine A</th>
<th>Medicine B</th>
</tr>
</thead>
<tbody>
<tr>
<td>How severe the hand eczema is after taking the medicine</td>
<td>90% clearing</td>
<td>25% clearing</td>
</tr>
<tr>
<td>Severe headaches during the first month of taking the medicine</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Chance of permanent hearing problems</td>
<td>20 out of 100 (20%)</td>
<td>None</td>
</tr>
<tr>
<td>Chance of permanent bone problems</td>
<td>5 out of 100 (5%)</td>
<td>20 out of 100 (20%)</td>
</tr>
<tr>
<td>Chance of thoughts of suicide</td>
<td>10 out of 100 (10%)</td>
<td>None</td>
</tr>
</tbody>
</table>

Which would you choose?

<table>
<thead>
<tr>
<th>Medicine A</th>
<th>Medicine B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Maximum Acceptable Risk Calculation for Renal Cell Carcinoma

\[ \Delta = -0.84 \]

Wong, et al. (2012) *J Medical Economics*

\[ \Delta = +0.84 \]

Graph showing preference weights for progression-free survival and chance of liver failure over different time periods.
Minimum Acceptable Efficacy
Renal Cell Carcinoma

\[ \Delta = -0.46 \]

Wong, et al. (2012) J Medical Economics
Maximum Acceptable Risk
Alzheimer’s Disease

Maximum Acceptable Risk
Menopause Symptoms

Maximum Acceptable Risk
Crohn’s Disease

Benefit-Risk Trade-off Curve

Maximum Acceptable PML Risk

0% 2% 4% 6% 8%

Severe to Moderate  Moderate to Remission  Severe to Mild  Severe to Remission

Johnson, et al. (2007) Gastroenterology
Maximum Acceptable Risk, Physicians vs Patients
Crohn’s Disease

Minimum Acceptable Efficacy

Weight-Loss Devices

Minimum Acceptable Total Body Weight Loss (%)

Mortality Risk

Benefit-Risk Trade-off Curves

Laparoscopic surgery
Open surgery

Unpublished
How Good is the Evidence Base?

23 published studies as of March 2012

<table>
<thead>
<tr>
<th>Therapeutic Area</th>
<th>Published Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastroenterology</td>
<td>4</td>
</tr>
<tr>
<td>Dermatology</td>
<td>3</td>
</tr>
<tr>
<td>Rheumatology</td>
<td>3</td>
</tr>
<tr>
<td>Endocrinology</td>
<td>3</td>
</tr>
<tr>
<td>Neurology</td>
<td>3</td>
</tr>
<tr>
<td>Autoimmune</td>
<td>2</td>
</tr>
<tr>
<td>Pulmonary Disease</td>
<td>2</td>
</tr>
<tr>
<td>Oncology</td>
<td>2</td>
</tr>
<tr>
<td>Hematology</td>
<td>1</td>
</tr>
<tr>
<td>Nephrology</td>
<td>1</td>
</tr>
</tbody>
</table>

Hauber, et al. (2013) Appl Health Econ Health Policy
Challenges

- Acceptance of quantitative data on patient preferences as relevant evidence
- Clinicians’ unfamiliarity with preference-elicitation methods
- Limited number of benefit-risk preference studies
- Institutional resistance to change
“When asking the public to assist in determining health priorities, we should use techniques that allow people to reveal their true preferences. If not, why bother asking them at all?”

Gafni, Social Science and Medicine, 1995
Patient Preferences Initiative
Survey for Weight-Loss Devices

Telba Irony, PhD
Chief, General and Surgical Devices Branch
Division of Biostatistics
Office of Surveillance and Biometrics
Center for Devices and Radiological Health
Background

• *Patients, Physicians, and CDRH* have the same goals: maximize treatment benefits while minimizing risks

• They may have different *perspectives* on the tradeoffs of benefits and risks of treatments

• CDRH explores ways to incorporate patients’ preferences on such tradeoffs into its decision making process ➔ survey on patient preferences

*Hard Tradeoffs*
Patient tolerance for risk and perspective on benefit

“Risk tolerance will vary among patients, and this will affect individual patient decisions as to whether the risks are acceptable in exchange for a probable benefit. ... FDA would consider evidence relating to patients’ perspective of what constitutes a meaningful benefit.”
A pilot study: devices to treat obesity

- Obesity is a condition with high prevalence
- Treating obese patients has a high Public Health impact
- Treatments involve difficult benefit-risks tradeoffs
- Gastric band is the only approved device in US
- Broad array of potential devices with diverse benefit-risk profiles
- Difficult decisions will need to be made
# Treatments for Obesity

**Hard Choices, Wide Range of Benefit-Risk Tradeoffs**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Wt. Loss: 1-5%</th>
<th>Wt. Loss: 7-9%*</th>
<th>Wt. Loss: 17-20%</th>
<th>Wt. Loss: ≈ 30%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very mild risk:</strong> exercise related injuries; Yo-Yo diet</td>
<td><strong>Mild-mod. risk:</strong> fetal toxicity; increase in HR; suicidal thoughts; glaucoma, etc.</td>
<td><strong>Mod.-high risk:</strong> band erosion &amp; explant; laparoscopic surgery related mortality and risks; etc.</td>
<td><strong>High risk:</strong> Blood clot; excessive bleeding; heart attack; leaks in GI system; death, malnutrition, etc.</td>
<td></td>
</tr>
<tr>
<td><strong>Indication:</strong> For almost every one</td>
<td>• BMI ≥ 30 kg/m²</td>
<td>• BMI ≥ 35 kg/m²</td>
<td>Medical judgment; med. societies' guidelines vary</td>
<td></td>
</tr>
<tr>
<td>• BMI ≥ 27 + Weight-related comorbidity</td>
<td>• BMI ≥ 30 + Weight-related comorbidity</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Which is a favorable Benefit-Risk tradeoff?

Patient’s Preference

- Weight Loss
  - Benefit
  - Risk

New Device

Gastropasty

Diet Exercise
Pilot study objectives

• Assess feasibility of eliciting patients preferences
• Assess use of quantitative patients preferences
• Receive input and learn
• Explore ways of using the survey results in CDRH’s decision making process
• Compare tradeoff preferences of patients who underwent weight-loss procedures with those who did not
Subjects: obese subjects willing to lose weight

- Survey jointly developed by CDRH and RTI Health Solutions
- ~650 subjects with BMI ≥ 30 kg/m² (self-reported weight and height in the last 3 years)
- Recruited from existing national cross-section internet panel with more than 11,600 panelists
- Well-informed subjects
- Administered via the Internet; coverage of non-internet households: free notebooks and internet services provided
- Oversampled subgroup of subjects who underwent prior weight reduction procedures (gastric bypass or banding) to capture “before and after” experiences
Discrete-Choice Experiments

- Respondents evaluate choices between pairs of hypothetical weight-loss device treatments
- Each treatment is defined by its attributes, including the surgical procedure
- Each attribute has a set of levels (values)
- The resulting pattern of choices reveals the patients’ preferences
- Ex: Patients would be willing to tolerate 2 more months of mild side effects to achieve an additional weight loss of 25 lbs.
## Attributes and Levels: Obesity Survey

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Operation</td>
<td>Endoscopic&lt;br&gt;Laparoscopic&lt;br&gt;Open Surgery</td>
</tr>
<tr>
<td>Diet restrictions</td>
<td>Eat ¼ cup at a time&lt;br&gt;Wait 4 hours between eating&lt;br&gt;Can’t eat hard-to-digest foods</td>
</tr>
<tr>
<td>Average weight-loss</td>
<td>5% of body weight&lt;br&gt;10% of body weight&lt;br&gt;20% of body weight&lt;br&gt;30% of body weight</td>
</tr>
<tr>
<td>How long weight-loss lasts</td>
<td>6 months&lt;br&gt;1 year&lt;br&gt;5 years</td>
</tr>
<tr>
<td>Comorbidity improvement</td>
<td>None&lt;br&gt;Reduce risk (or current dosage) by half&lt;br&gt;Eliminate risk (or current dosage)</td>
</tr>
</tbody>
</table>
## More Attributes and Levels: Obesity Survey

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>How long side effect lasts</td>
<td>None, 1 month, 1 year, 5 years</td>
</tr>
<tr>
<td>Chance of serious Side Effects</td>
<td>None, 5% chance hospitalization, no surgery, 20% chance hospitalization, no surgery, 5% hospitalization for surgery</td>
</tr>
<tr>
<td>requiring hospitalization</td>
<td></td>
</tr>
<tr>
<td>Chance of dying from getting weight-loss device</td>
<td>None, 1%, 3%, 5%, 10%</td>
</tr>
<tr>
<td>Feature</td>
<td>Device A</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Type of operation</td>
<td>Endoscopic surgery</td>
</tr>
<tr>
<td>Recommended diet restriction</td>
<td>Wait 4 hours between meals</td>
</tr>
<tr>
<td>On average, how much weight is lost</td>
<td>30 lbs.</td>
</tr>
<tr>
<td>On average, how long the weight loss lasts</td>
<td>Weight loss lasts 5 years</td>
</tr>
<tr>
<td>Average reduction in dose of prescription drugs for diabetes at the lower weight</td>
<td>Eliminates the need for prescription drug</td>
</tr>
<tr>
<td>On average, how long side effects last</td>
<td>Last 1 month</td>
</tr>
<tr>
<td>Chance of a side effect requiring hospitalization</td>
<td>None</td>
</tr>
<tr>
<td>Chance of dying from getting the weight loss device</td>
<td>![10% (10 out of 100)]</td>
</tr>
<tr>
<td>Which weight-loss device do you think is better for people like you?</td>
<td><img src="https://example.com" alt="Device A" /></td>
</tr>
</tbody>
</table>
## Respondent Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Study Sample</th>
<th>General Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean BMI</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Mean age, years</td>
<td>51</td>
<td>45</td>
</tr>
<tr>
<td>Female</td>
<td>57%</td>
<td>51%</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>73%</td>
<td>63%</td>
</tr>
<tr>
<td>Associate degree or higher</td>
<td>39%</td>
<td>37%</td>
</tr>
</tbody>
</table>
Results: Preference Weights

Better outcomes have significantly larger weights.
Relative Importance within Categorical Attributes

- Preference Weights
- Attributes and Levels
- No difference between diet restrictions
  - Wait 4 hours and Eat ¼ cup
- But No sweets or hard to digest foods is worse
- No difference between diet restrictions
- Type of Surgery
- Preference Weights
- Mortality Risk
- Weight Loss Duration
- Side-Effect Duration
- Side Effects Requiring Hospitalization
- Diet Restrictions
- Co-morbidities
- Mortality Risk

- 30%, 20%, 10%, 5%, 0%
- 60 months, 12 months, 6 months, 0 months
- None, 5% no surgery, 20% no surgery, 5% surgery
- Wait 4 hours, Eat ¼ cup of food
- No sweets, hard-to-digest
- Eliminate need/risk, 50% dose/risk, No change
- Laparoscopic, Endoscopic, Open Surgery
- 0%, 1%, 3%, 5%
Mortality Risk, Weight Loss, Weight-Loss Duration, are the most important attributes.

Side Effect is the least important attribute.

Most Important Attributes:

- Weight Loss
- Weight-Loss Duration
- Side-Effect Duration
- Side Effects Requiring Hospitalization
- Diet Restrictions
- Co-morbidities
- Type of Surgery
- Mortality Risk

Attributes and Levels:

- Preference Weights
- Loss
- Side-Effect
- Duration
- Co-morbidities
- Mortality Risk

Side Effect is the least important attribute.

Mortality Risk, Weight Loss, Weight-Loss Duration, are the most important attributes.
Key Findings and Product

- Nearly all respondents completed the Web-enabled survey successfully
- Multiple validity checks indicate high-quality preference data
- “Risk of death” from surgery for the weight-loss device was the most important attribute
- “Side Effects” was the least important attribute
- **Product**: Decision Aid Tool
Key Findings

Minimum Acceptable Benefit by Risk

To accept a device associated with a mortality risk of 0.5%, an average respondent (243lbs and 5’10”) would expect at least the following combination of weight loss amount and duration:

<table>
<thead>
<tr>
<th>Amount (% Body Weight)</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>24%</td>
<td>24 months</td>
</tr>
<tr>
<td>22%</td>
<td>36 months</td>
</tr>
<tr>
<td>20%</td>
<td>18 months</td>
</tr>
<tr>
<td>18%</td>
<td>60 months</td>
</tr>
</tbody>
</table>
**Decision Aid Tool**

- Calculates the minimum benefit patients would require for a treatment with a given mortality risk and other characteristics
- Calculates the maximum risk patients would accept for a treatment with given weight-loss benefit and other characteristics
- Results reported for risk averse, risk tolerant and risk neutral patients
- The estimated values help the clinical trial design and analysis stage: definition of “minimum clinically significant benefit”
# Decision Aid Tool

## MAR and MAB Calculator for Weight-Loss Devices

<table>
<thead>
<tr>
<th>Device outcomes and features</th>
<th>Enter device characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Body Weight loss (TBWL%)</strong></td>
<td>28.0%</td>
</tr>
<tr>
<td><strong>Side effect duration (months)</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Chance of side effects requiring hospitalization</strong></td>
<td>5%, surgery</td>
</tr>
<tr>
<td><strong>Recommended diet restrictions</strong></td>
<td>Wait 4 hours between eating</td>
</tr>
<tr>
<td><strong>Expected duration of weight loss (months)</strong></td>
<td>60</td>
</tr>
<tr>
<td><strong>Comorbidities: Reduce treatment dose / chance</strong></td>
<td>No change</td>
</tr>
<tr>
<td><strong>Type of operation</strong></td>
<td>Laparoscopic surgery</td>
</tr>
</tbody>
</table>

## Additional input

- **Select the group of interest**
  - Risk-neutral group
- **Enter base weight for the sample**
  - 279 (lbs.)

## Maximum Acceptable Risk for Selected Group

- **0.10% (95% CI -0.58 to 0.77)**

Note: MAR < 0 indicates utility of no device is greater than the utility of the indicated device. MAB < 0 indicates that any level of weight loss would be acceptable given the device characteristics.

## Relative contributions of device attributes

Average utility of not getting a weight-loss device
Type of operation
Comorbidities: Reduce treatment dose / chance
Expected Duration of weight loss (months)
Recommended diet restrictions
Chance of side effects requiring hospitalization
Side effect duration (months)
Total Body Weight loss (TBWL%)
<table>
<thead>
<tr>
<th>Subgroups</th>
<th>Differences in Preferences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior gastric surgery</td>
<td>Mortality risk less important</td>
</tr>
<tr>
<td></td>
<td>Weight loss more important</td>
</tr>
<tr>
<td>Older than median age</td>
<td>Duration of side effects, operation type, mortality risk more important</td>
</tr>
<tr>
<td>35 &lt; BMI ≤ 40</td>
<td>Weight loss more important than other groups</td>
</tr>
<tr>
<td>BMI &gt; 40</td>
<td>Preferences not different than 30 &lt; BMI ≤ 40</td>
</tr>
</tbody>
</table>
Conclusions

• The study provides decision-relevant evidence for comparing benefits and risks for weight-loss devices

• It used best-practice methods to ensure the highest possible data quality and analytical rigor

• It quantifies patient’s values to help define minimum clinically meaningful weight-loss

• It is the first example designed to assist a regulatory agency in its decision making process by estimating the values patients give to risks and benefits

• The method can be adapted for other medical treatments

• This pilot study sheds light on future steps for CDRH to develop a patient-preferences guidance document