

## SUMMARY REPORT-90 DAY PROJECT

### **Establishing the Business Case for Quality in Health Care**

#### *Reducing Waste to Achieve a 1% to 3% Savings in Operating Costs per Year*

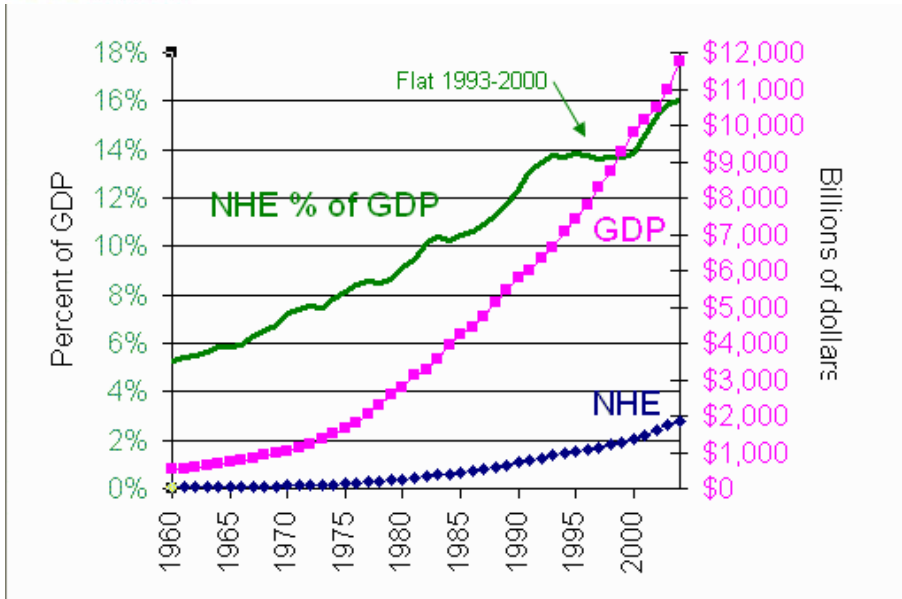
**Intent:** At present, the rationale for health care providers to undertake quality improvement (QI) initiatives rests largely on “doing the right thing.” Any financial benefit resulting from QI efforts is regarded as an attractive side effect. The aim of improvement is expressed in quality of care terms. A new dimension can be added to the portfolio of quality improvement efforts: namely, the systematic identification and elimination of waste, while maintaining or improving quality. Here, the aim is primarily a financial one; any positive impact on quality is of secondary importance.

This Institute for Healthcare Improvement (IHI) Research and Development Team sought to understand the administrative and leadership components necessary to undertake an initiative to systematically identify and eliminate waste while also maintaining or improving quality, and to create a portfolio of work that organizations could use to achieve a 1% to 3% savings in operating costs year-on-year.

**Background:** Health care costs in the United States are rising at an unsustainable rate (see Figure 1). Despite the large and increasing health care expenditure, health outcomes in the US are below those of other developed countries (see Figure 2). Furthermore studies have demonstrated that those states with higher spending have worse health outcomes (see Figure 3).

**Figure 1:** US health care are rising and a greater percentage of the gross domestic product is spent on health care: when will this inflation reach a breaking point?

In 2004 the United States spent \$1,900 billion on health care spending, which represents 16% of the US gross domestic product (GDP) of \$11,700 billion. In 1960, US health care expenditures comprised only 5.1% of the GDP. While the US was able to maintain the increase in national health expenditure (NHE) as a percent of GDP from 1993 to 2000 at slightly less than 14%, the rate is once again increasing. Most other developed countries spend less than 10% of their GDP on health care (and most achieve better results on generally accepted population health measures, e.g. life expectancy).



**Legend:**

The green line shows the percentage of the gross domestic product going toward national health expenditure. It is measured by the scale on the left axis.

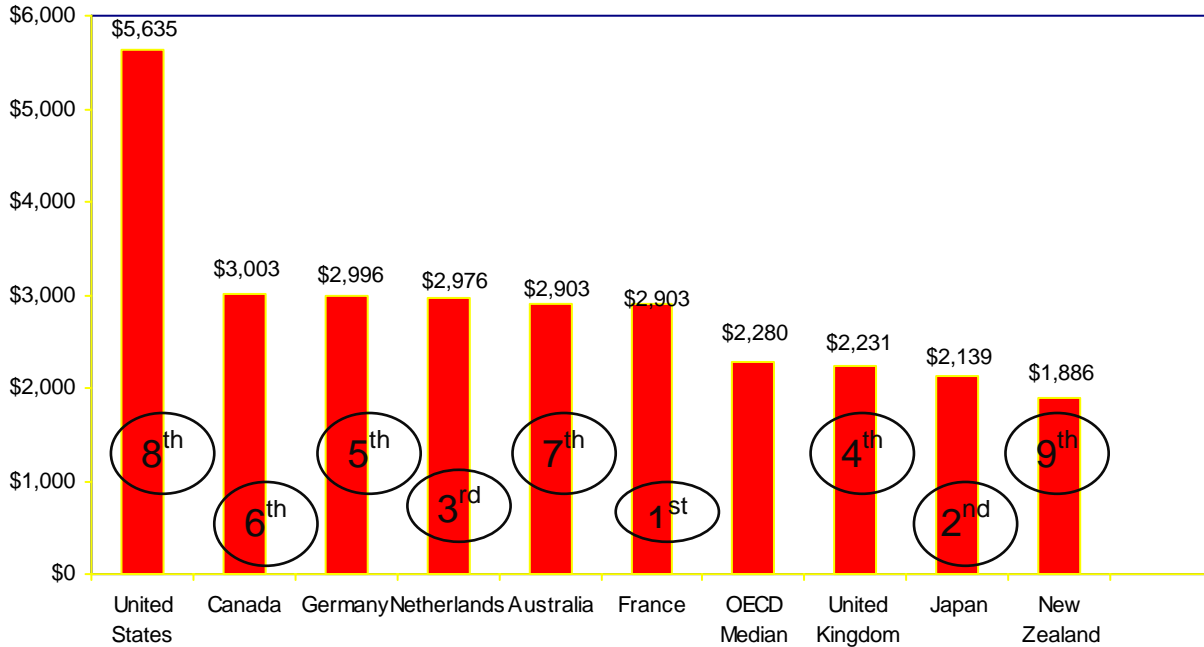
The magenta line, showing gross domestic product (GDP), and the blue line, for national health expenditure (NHE), are in billions of dollars, as measured by the right axis.

Source: University of South Carolina, Arnold School of Public Health, Department of Health Services Policy and Management, posted August 28, 2006. (<http://hspm.sph.sc.edu/Courses/Econ/Classes/nhe00/>)

**Figure 2:** Per capita spending compared to health ranking

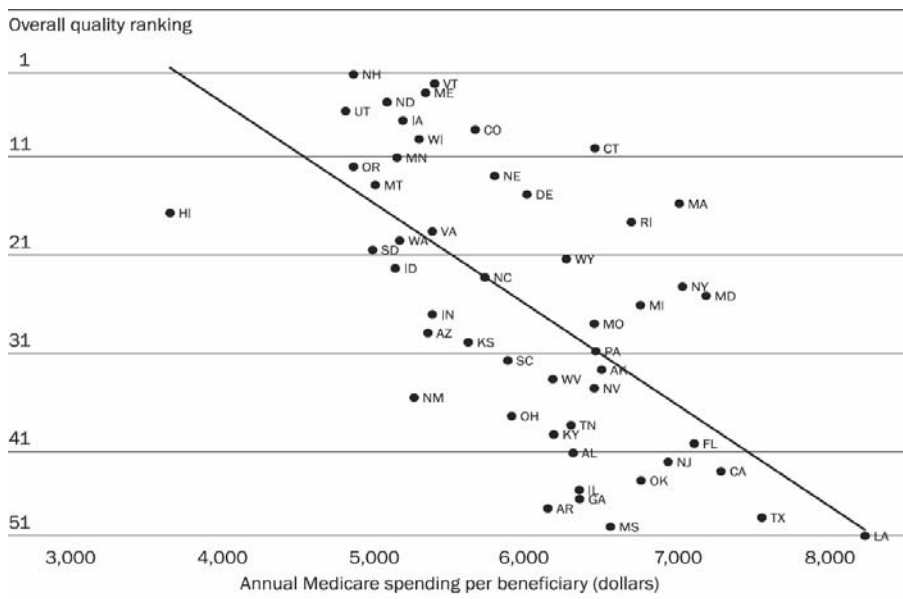
The red bars on the figure below represent the per capita health care spending for selected Organisation for Economic Co-operation and Development (OECD) countries. The numbers in black circles represent the World Health Organization (WHO) ranking of health system performance. While the United States spends far more on health care per capita (more than double the OECD median) it is ranked eighth in health performance.

**Health Care Spending per Capita for Selected OECD Countries  
Adjusted for Differences in Cost of Living,  
2003**



Source: OECD Health Data, 2005; WHO rankings of Health System Performance, 2004.

**Figure 3:** States in the US with higher health care expenditures demonstrating lower or worse quality outcomes



Source: Baicker K, Chandra A. Medicare spending, the physician workforce, and beneficiaries' quality of care. *Health Aff (Millwood)*. 2004 Jan-Jun;Suppl Web Exclusives:W4-184-97.

There is also mounting evidence that better quality health care can come at a systematically lower cost. Probably the most dramatic demonstration of this is the ongoing Centers for Medicare & Medicaid Services (CMS)/Premier Pay-for-Performance initiative. Catalyzed by a moderate financial incentive at the institutional level, the results of the initiative demonstrated that better care was achievable at lower cost.

Many of the components that are necessary to achieve high quality care at a lower cost are based on areas in which IHI has worked and subsequently developed public program offerings, including the topic areas of patient safety, patient flow, and reliability of health care. However, IHI has not traditionally focused on waste elimination as a dimension of cost reduction. This aspect of carefully targeting waste reduction is rapidly developing. It will be necessary to deconstruct existing processes and ask questions such as: Which elements in the care delivery process add value to patient experience or outcome? Could the same or greater value be delivered at lower cost?

This 90-day project was based on the following assumptions (which have been strengthened by our experience to date):

- Better care does not always mean higher cost care.
- Providers will face steadily increasing pressure to take cost (i.e., reduce waste) out of the system while maintaining or increasing the quality of care. This is evidenced by the following:
  - Health care inflation costs continue to outstrip increases in GDP;
  - The increasing availability, reliability, and use of information on provider quality;
  - The current trend whereby payors reward providers who offer both low cost and high quality care by directing patient volume to these providers (e.g., tiered networks) and by offering financial incentives (e.g., CMS/Premier Pay-for-Performance initiative; multiple initiatives by Massachusetts payors); and
  - The appearance of disruptive entrants (e.g., Minute Clinic) offering care that meets specific patient needs at radically lower cost than traditional providers.
- To achieve the goal of better care for all, it is imperative that delivery costs fall, which in turn reduces costs to patients (while providers preserve an acceptable margin).

The profitability of health care providers is cyclical, and currently US providers are enjoying greater than normal profit margins that average around 4% to 5%. This profitability reduces the short-term pressure to address waste, but does not alter the mid- and long-term imperative.

**Approach to Waste Reduction:** According to Noriaki Kano (a Japanese thinker on process-design and quality improvement), improving the quality of a product or service can be considered using three categories. Each represents a different type of quality improvement lever:

- Lever 1: Eliminate the quality problems that arise because the customers' expectations are not met.
- Lever 2: Reduce cost significantly while maintaining or improving quality.
- Lever 3: Expand customers' expectations by providing products and services perceived as unusually high in value.

Historically, the US health care industry, unlike nearly all other industries, has focused almost exclusively on Levers 1 and 3. There has been little incentive for organizations or individuals to

address issues related to Lever 2. Outside health care, however, focusing on Lever 2 (henceforth referred to as a Kano 2 approach) to improve value while reducing costs is almost always a component of a balanced strategy that incorporates improvements for all three levers. Most organizations that have a well-developed waste reduction component as part of their business strategy are able to remove 1% to 3% of costs from their total annual expenses. These cost savings contribute to their overall financial success, and thus enable the organizations to deliver greater value to their customers, in the form of higher quality products or services at lower costs.

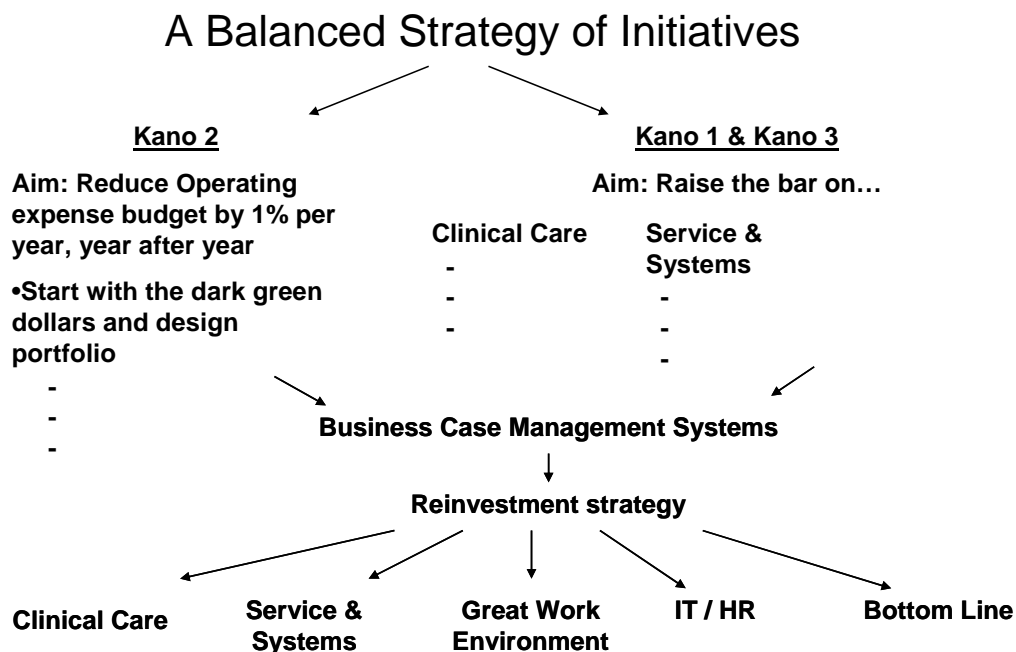
In such environments, waste reduction makes the organization successful and individuals successful within it. At General Electric (GE), for example, the ability to reduce cost while improving a product is a major consideration in evaluating and promoting GE employees. Leaders focus on it, systems and tools are built to promote it, and people develop skills and mindsets to deliver it.

Within health care, however, a Kano 2 approach represents new and radical thinking, even a cultural shift. This is *not* traditional cost-cutting, which is all too often (correctly) perceived by clinicians as harmful to care and arbitrary. The Kano 2 approach is a systematic focus on *waste*, yielding cost savings while also maintaining or improving care.

Up to this point, IHI focused efforts to make the business case for quality on trying to identify the “dark green dollars” (i.e., dollars that can be tracked to the bottom line) resulting from QI projects. This method proved very challenging—though cost savings are often claimed, it is rarely (if ever) possible to track the savings to a specific budget line item. IHI’s new way of thinking about “dark green dollars” is to express the improvement aim as a cost reduction target: identify waste and remove it. By using this approach organizations should be capable of yielding a savings of 1% to 3% of operating cost year-on-year while also maintaining or improving the level of care delivered.

**Current Landscape:** This 90-day project continues to build on the approach set out by Tom Nolan and Maureen Bisognano in their article, *Finding the Balance Between Cost and Quality* (Nolan T, Bisognano M. Finding the balance between quality and cost. *Healthcare Financial Management*. Apr 2006;60(4):66-72.), and applying what other industries have been doing for years to health care (see Figure 5).

**Figure 5:** Strategy to balance cost and quality, proposed by Nolan and Bisognano



The 90-day project team engaged in conversations with a small number of organizations that had started cost reduction initiatives with the hope of understanding the components necessary to create a successful balanced strategy of cost savings focusing on a Kano 2 approach to waste reduction (i.e., “dark green dollars”). The cost reduction goals within the organizations ranged from \$1 million to \$15 million (see Table 1).

**Table 1:** Organizations in the Sample and Their Waste Reduction Goals

Organization	Waste Reduction Goal
An integrated health care network	\$6 million per year
A hospital system	\$12 million per year (0.5% of operating budget)*
A children’s hospital	\$15 million (1.5% of operating budget)
A 300-bed hospital and health care network	\$1 million (0.6% of operating budget)
A 500-bed academic medical center	\$15 million*

\* Waste reduction goal includes revenue enhancement components

**Results:** The goal of this 90-day project was to create a portfolio of work that organizations could use to achieve a 1% to 3% savings year-on-year and to gather enough information to allow IHI to determine the appropriate next steps for business case for quality efforts. Earlier work in this area showed us that both health care managers and clinicians have substantial will to reduce waste and costs while improving quality of care, but multiple barriers to success exist. We knew the task was complex and that getting traction would be difficult. Nonetheless, the 90-day project team was successful in engaging four of the five organizations we interviewed in our initial sample (see Table 1). Based on previous work, we believe all five organizations are industry pioneers in the application of systematic methods to waste reduction in health care delivery.

Lessons Learned:

- The culture to reduce waste is not yet present in health care. Even those organizations whose leaders understand the need to reduce waste and are successfully executing strategies to achieve reductions do not have cultures in which waste reduction efforts have been spread throughout the organization to all staff. Without serious financial pressure it may be difficult to mobilize the workforce.
- Turning will and ideas into execution is extremely challenging. There are multiple barriers to successfully reducing waste, including:
  - The complexity of the delivery process: understanding what is waste and what contributes value to patient outcome and experience;
  - A lack of clarity on cost at both a diagnostic group and individual patient level;
  - The perceived or real misalignment of incentives, for example, a belief that preventable complications, though professionally and ethically undesirable are nonetheless reimbursed (and possibly more profitable than uncomplicated care);
  - A sense of frustration at the failure of previous efforts, and (often) suspicion about management’s intent when cost enters the conversation;
  - A lack of real teamwork between clinicians and finance/management in such efforts;
  - A lack of knowledge, skills, systems, and tools to identify, prioritize, and address waste, and to track progress through to a budget’s bottom line; and

- More urgent (and less risky) competing priorities for both leaders and those at the front-line of care delivery.
- Conversations about “dark green dollars” typically focus on revenue generation rather than cost reduction. The traditional and highly successful approach to improving the bottom line has been, and continues to be, focused on revenue enhancement. If costs can increase essentially unchecked, revenue enhancement becomes a much easier approach to improving margin than the tough and potentially risky task of focusing on reducing costs.
- There is substantial resistance, especially among clinicians, to adopting a true Kano 2 approach. This resistance is partly attributable to cultural norms which have put the latest technology innovations at the heart of health care improvement. Furthermore, redesigning work processes to eliminate waste (and therefore cost) requires a team approach, and current quality reporting pressures and other documentation burdens often push staff away from systematic redesign of care and waste identification.
- When asking clinical staff to engage in waste removal initiatives, it is important to “give more than you ask for.” Clinical staff are excited by improving quality and typically much less excited (or even suspicious) of efforts focused on cost. However, a majority of improvement projects will still be focused on quality improvement rather than waste removal—it is important to acknowledge these projects and give staff the ability to work on them to build will for Kano 2 efforts. For example, one organization we interviewed aims to achieve a \$5 - \$6 million savings each year. Most of this cost savings is achieved through only 20% of their improvement projects; the other 80% are improvement efforts that management or clinical staff feel are essential purely for a quality imperative. By working on the 80% they are able to build will among staff to contribute to the 20% of those projects that will produce a financial return.
- When “dark green dollars” are realized, there are almost limitless possibilities for spending the money that is saved, ranging from staff bonuses or facility improvements to enhancing access for underserved patients. Before beginning an improvement project, it is vital to engage staff in conversations about and collectively agree upon how to allocate any savings that result. By not being explicit up front, managers run the risk that clinical staff will not be engaged in the project, or worse, that they regard the project as another attempt to cut costs from their budget to compensate for shortcomings elsewhere in the organization.

### **Changes/Design Concepts:**

#### Drivers of Waste Reduction

By examining the types of waste reduction projects the five organizations we interviewed were engaged in, we created a driver diagram to guide improvement in this area (see Figure 6). Five primary drivers typically characterize an organization’s waste removal and redesign efforts consistent with the Kano 2 principles:

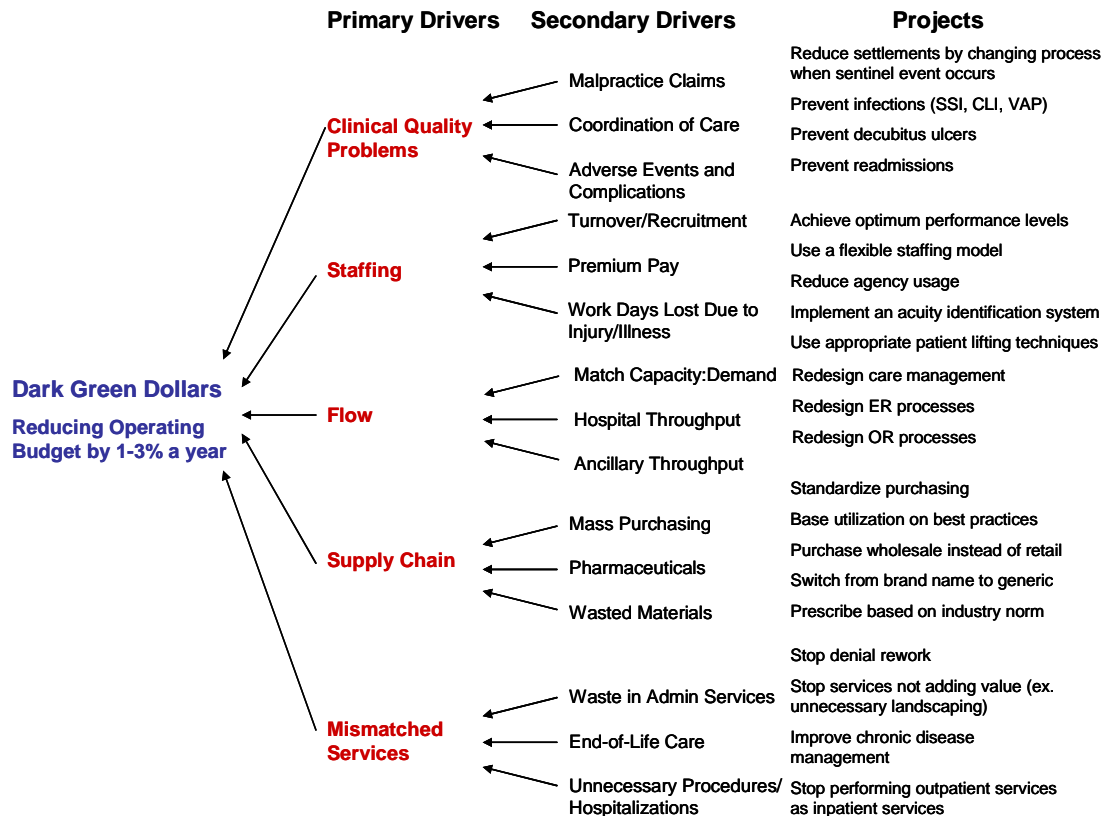
- *Clinical Quality Problems*: There are many examples of health care processes that are wasteful for both patients and staff. Savings can be achieved by removing waste from care processes such as better coordinating care and preventing adverse events, along with their associated costs.



- *Staffing (especially overtime and agency nursing)*: Redesigning wasteful processes allows staff to perform to their highest capacity which results in higher staff satisfaction, safer care, and more consistent staffing.
- *Flow*: By redesigning and smoothing patient flow through both inpatient and outpatient services, throughput can be maximized to meet demand.
- *Supply Chain (both clinical and non-clinical)*: This is perhaps the best developed aspect of waste removal in health care to date. Enormous savings can and are being achieved by better managing the purchase of equipment and supplies, and the use of non-clinical supplies, medications and clinical materials (e.g., standardization of equipment, reduction in unused but discarded supplies).
- *Mismatched Services*: Identify services that are either occurring in the wrong setting (e.g., end-of-life palliative care in the ICU) or should not be occurring at all (e.g., unnecessary hospitalizations) and eliminate these services. There is ample room for waste removal in administrative services by eliminating rework and maximizing employee time spent on value-added work.

**Figure 6:** Driver diagram for waste reduction

The primary drivers directly affect the desired outcome—in this case, generating “dark green dollars” by reducing the annual operating budget by 1% to 3%. Secondary drivers are those items that directly feed into the primary driver. Based on a secondary driver, a project charter could be established (sample projects are provided below in the diagram).





### A New Communication Mechanism

It is difficult to address quality initiatives with health care providers from the perspective of waste removal and financial savings. Frequently, patient care is improved and adverse events are reduced, but savings do not make it to the bottom line as “dark green dollars.” Part of the difficulty is that a financial target is not set at the start of the improvement project and thus savings are not tracked. Another contributing factor is that health care professionals have a tendency to revert from Kano 2 projects into Kano 1 or Kano 3 projects because they are most familiar with these types of improvement approaches. Table 2 helps to clarify the difference between Kano 1, Kano 2, and Kano 3 projects categorized by each of the primary drivers (column 1).

**Table 2:** Exploring the Differences between Improvement Projects Focused on Kano 1, Kano 2, and Kano 3 Approaches

	<b>Kano 1</b> (Focus on Lever 1: Eliminate quality problems that arise because the customers' expectations are not met)	<b>Kano 2</b> (Focus on Lever 2: Reduce cost significantly while maintaining or improving quality)	<b>Kano 3</b> (Focus on Lever 3: Expand customers' expectations by providing products and services perceived as unusually high in value)
<b>Clinical Quality Problems</b>	Verify the surgical site with the patient to prevent wrong-site surgery	Open only those instruments that are used during the procedure	Use robotic or minimally invasive surgery
<b>Staffing</b>	Use a human resources system to validate licensing and in-service education requirements	Implement a patient acuity system to ensure proper staff levels and mix	Create a flex hour/benefit system
<b>Flow</b>	Doctors triage patients while they are in the waiting room	Redesign ER and OR packs to reduce waste of supplies that aren't needed	Implement electronic medical records to reduce the time it takes for all care providers to receive results
<b>Supply Chain</b>	Relocate the staff pharmacist to the unit floor to ensure proper medication dosing	Implement a distribution system to ensure that pharmaceuticals nearing their expiration date are used first	Implement bar coding technology on pharmaceuticals to track their use
<b>Mismatched Services</b>	Have patients self-administer pain medication to ensure proper pain control	Ensure patient admission to the proper care area (palliative care vs. ICU care)	Create a new wing for palliative care services

### Creating a Portfolio of Work

Organizations will need to create a portfolio of work that is both aligned with their strategy and fits with their financial needs. The portfolio can be created by examining and coming to a shared

understanding of current financials and operations and using the Driver Diagram as a framework for improvement efforts. To illustrate the steps necessary to create a portfolio of work to reduce waste, by 1% to 3% of operating expenses we will use an example of a hypothetical 235-bed acute care hospital that is engaging in a waste reduction effort.

*Step 1: Understand the Financials in Your Organization*

All parties involved in the waste reduction effort, not just those involved in the hospital’s finance department, must understand the financial situation in the hospital. Table 3 serves as the profit and loss (P & L) statement, demonstrating an operating margin of 3.3%. (The revenue and expense categories are based on “normal” operating parameters.)

**Table 3: Profit and Loss Statement**

<b>SAMPLE HOSPITAL (235 Beds)</b>	
Consolidated Statement of Revenue & Expense	
(for a 12-month period)	
\$000s Omitted	
	Sample FY Annual <u>P &amp; L</u>
Operating Revenue:	
Inpatient Service Revenue	265,421
Outpatient Service Revenue	168,220
 Gross Revenue	 433,641
Less: Contractuals	279,495
Other Deductions	8,637
Net Patient Service Revenue	145,509
Other Operating Revenue	13,750
 Total Operating Revenue	 159,259
Operating Expenses:	
Salaries-Wages	61,315
Employee Benefits	18,315
Purchased Services	21,564
Supplies	26,270
Physician Fees	1,843
Rent, Utilities, etc.	16,853
Depreciation and Amortization	7,906
 Total Operating Expenses (before Interest Expense)	 154,066
 Operating Margin Before Interest	 5,193 3.3%

### *Step 2: Understand Your Organization's Operations*

In order to know what is possible with regard to reducing waste, it is important to understand some fundamental operations in the hospital, as well as to compare the hospital's current performance to other similar organizations. Table 4 shows various operating indicators of this well-run hypothetical acute care facility.

**Table 4: Key Operating Statistics**

<b>Key Operating Statistics:</b>	
Average % Occupancy	72%
Average Bed Occupancy	169
Length of Stay	4.6
Annual Patient Days	61,758
Annual Discharges	13,426
Inpatient Revenue/Day	\$4,298
Adjusted Patient Days	100,899
Adjusted Average Bed Occupied	276
Adjusted Patient Discharges	21,935
FTEs/Adjusted Occupied Bed (33rd percentile)	4.03
Total FTEs	1,114
Overtime (33rd percentile)	2.53%
Agency Usage	2.0%

### *Step 3: Outline the Overall Savings Potential*

Generate an outline of potential savings to help focus the organization's strategy and gain momentum for the initiative. Table 5 outlines the effect a year-on-year (for four years) compounded expense reduction would have on a 1%, 2%, or 3% decline in operating expenses—what we refer to as the “Bogie” in the table below. The total operating revenue at this hypothetical hospital is \$159,259 million; the total operating expenses is \$154,066 million; the income (loss) from operations is \$5,193 million; and the margin is 3.3%. Frequently, a 1% reduction is thought to have little, if any, effect on the bottom line. In this hospital a 1% decrease in total operating expense results in an operating revenue of \$152,525 million. While this change does not seem dramatic, it results in the margin increasing from 3.3% to 4.2%. A 2% decrease in expenses brings the margin to 5.2%, and a 3% reduction nearly doubles the margin to 6.2%.

By reducing operating expenses by 1% to 3% year-on-year, organizations will be able to increase their margin and offset costs. For example, a 1% decrease in operating expenses in this hospital results in an increase in operating margin from 3.3% to 4.2%, as outlined above. If the organization takes out another 1% in Year 2, their margin increases to 5.2%; after three years of reduction, they achieve a 6.1% margin; and after four years the margin increases to 7.1%. The full value of this increase in margin may not be realized due to changes in expenses and inflation, but it will certainly offset these costs.

(Note: For the purposes of illustration, the revenue for this hospital is held at a constant with the understanding that this assumption is not the norm.)

**Table 5: Potential Savings (\$000s Omitted)**

	Current Year	1% dec in Exp	2% dec in Exp	3% dec in Exp
<b>Revenue Constant</b>				
Total Operating Revenue	\$ 159,259	\$ 159,259	\$ 159,259	\$ 159,259
Total Operating Expense	\$ 154,066	152,525	150,985	149,444
Income (loss) from Operations	\$ 5,193	\$ 6,734	\$ 8,274	\$ 9,815
Margin	3.3%	4.2%	5.2%	6.2%
<b>The Bogie \$</b>		<b>\$ 1,541</b>	<b>\$ 3,081</b>	<b>\$ 4,622</b>
	<b>Year #2</b>	<b>1% dec in Exp</b>	<b>2% dec in Exp</b>	<b>3% dec in Exp</b>
Total Operating Revenue		\$ 159,259	\$ 159,259	\$ 159,259
Total Operating Expense		151,000	147,965	144,961
Income (loss) from Operations	\$ -	\$ 8,259	\$ 11,294	\$ 14,298
Margin		5.2%	7.1%	9.0%
<b>The Bogie \$</b>		<b>\$ 1,525</b>	<b>\$ 3,020</b>	<b>\$ 4,483</b>
	<b>Year #3</b>	<b>1% dec in Exp</b>	<b>2% dec in Exp</b>	<b>3% dec in Exp</b>
Total Operating Revenue		\$ 159,259	\$ 159,259	\$ 159,259
Total Operating Expense		149,490	145,006	140,612
Income (loss) from Operations		\$ 9,769	\$ 14,253	\$ 18,647
Margin		6.1%	8.9%	11.7%
<b>The Bogie \$</b>		<b>\$ 1,510</b>	<b>\$ 2,959</b>	<b>\$ 4,349</b>
	<b>Year #4</b>	<b>1% dec in Exp</b>	<b>2% dec in Exp</b>	<b>3% dec in Exp</b>
Total Operating Revenue		\$ 159,259	\$ 159,259	\$ 159,259
Total Operating Expense		147,995	142,106	136,394
Income (loss) from Operations		\$ 11,264	\$ 17,153	\$ 22,865
Margin		7.1%	10.8%	14.4%
<b>The Bogie \$</b>		<b>\$ 1,495</b>	<b>\$ 2,900</b>	<b>\$ 4,218</b>

*Step 4: Identify Areas That are Not Subject to Waste Reduction and Calibrate the Goal*

Identify areas that the organization will not consider for waste reduction efforts. For example, at this hypothetical hospital, staffing will not be decreased through layoffs, although reductions through attrition are acceptable. Non-controllable expenses such as rent, utilities, depreciation, and amortization have been removed from the costs to be reduced. After removing these items, one-quarter of the total operating expenses are unavailable in Year 1. In order to achieve the Bogie in Year 1, controllable expenses would have to be reduced by 1.4% to achieve an overall 1% reduction in total operating expenses; a 2.8% reduction in controllable expenses would result in a 2% reduction in total operating expenses; and a 4.2% reduction in controllable expenses would result in a 3% reduction in total operating expenses (see Table 6). In this example, a 1% (\$1,541,000) goal for Year 1 has been established.

**Table 6: Organizational Areas That are Available or Unavailable for Waste Reduction**

<b>The Areas of Focus</b>		
\$000s Omitted		
<b>Year #1</b>	<b>Bogie \$</b>	<b>1,541</b>
<b>Operating Expenses:</b>		
Routine Salaries-Wages	\$ 59,764	
Overtime	\$ 1,551	
<b>Total Salary and Wages</b>		\$ 61,315
<b>Employee Benefits</b>		\$ 18,315
Purchase Services (Agency)	\$ 1,226	
Purchase Services (Other)	\$ 20,338	
<b>Total Purchase Services</b>		\$ 21,564
<b>Supplies</b>		\$ 26,270
<b>Physician Fees</b>		\$ 1,843
<b>Rent, Utilities, etc.</b>		\$ 16,853
<b>Depreciation and Amortization</b>		\$ 7,906
<b>Total Expenses</b>		\$ 154,066
<b>Controllables listed below:</b>		
Routine Salaries-Wages	\$ 59,764	
Overtime	\$ 1,551	
Purchase Services (Agency)	\$ 1,226	
Purchase Services (Other)	\$ 20,338	
Supplies	\$ 26,270	
Physician Fees	\$ 1,843	
<b>Total Controllable Expenses</b>	\$ 110,992	
<b>% Reduction to Achieve Bogie</b>		<b>1.4%</b>

*Step 5: Identify Areas of Focus*

Working through Steps 1 through 4 helps to identify areas of focus for Year 1. Just as it is important for all parties involved to understand the financial components of this work, it is essential for everyone involved to understand the waste reduction efforts, including the clinical components. It is important to be clear about both the waste reduction effort and also the target within each area. Several strategies can be used when selecting areas of focus; it is possible to focus all efforts on one of the primary drivers identified in Figure 6 or to select across several secondary drivers. The organization's approach depends on its specific needs. For this example the areas of focus for waste reduction are shown in Table 7. The derivation of the potential cost savings targets resulting from the waste reduction efforts are shown in Table 8.

**Table 7: Waste Reduction Efforts Identified**

Primary Driver	Secondary Driver	Area of Focus	Effort and Target	Savings (Table 7) \$000s Omitted
Clinical Quality Problems	Adverse Events and Complications	Supplies and Medication	Reduce supplies needed by 2% by reducing the number of complications	\$525
Staffing	Turnover/Recruitment	Agency Fees	Reduce agency fees by 25% by improving predictability in demand and the increased morale that results from the change	\$307
Staffing and Flow	Premium Pay and Match Staff Capacity to Patient Demand	Overtime	Reduce overtime by 20% by improving predictability in demand and reducing demand on staff from few complications	\$325
Mismatched Services	Waste in Administrative Services	FTE Reduction from Attrition	Reduce FTE salary and wages by 1% by not replacing staff following attrition	\$613

**Table 8: Derivation of Savings Possible for Waste Reduction Efforts**

<b>Ways to Reach the Bogie</b>			Bogie	\$ 1,541		
\$000s Omitted						
<b>Five Categories of Direct Operating Expense</b>	<b>Current</b>	<b>Current cost</b>	<b>Potential</b>	<b>Implied cost</b>	<b>Savings</b>	
1. Agency	2.0%	\$ 1,226	1.5%	\$ 920	\$ 307	
2. Overtime	2.53%	\$ 1,551	2.0%	\$ 1,226	\$ 325	
3. Supplies and 4. Medication	\$26,270	\$ 26,270	\$ 25,745	\$ 25,745	\$ 525	
5. FTE Reduction from Attrition	1,114	\$ 61,315	1,103	\$ 60,702	\$ 613	
<b>Total bottom line impact (in \$m)</b>					<b>\$ 1,770</b>	
<b>Total as % Bogie</b>					<b>114.9%</b>	

Establishing Goals for Kano 2 Waste Reduction Projects

It is important for each waste reduction project to have enough organizational background information to determine an appropriate goal for cost savings. During the conversations with hospitals in our sample, one hospital within a large hospital system explored the difference between their Medicare patients and their non-Medicare patients. They conducted an exhaustive review of the length of stay for both Medicare and non-Medicare patients across all diagnoses. One area that stood out during this review was gastroenterology; across 18 diagnoses (using APR-DRG codes) non-Medicare patients had shorter lengths of stay in 14 of the diagnoses. They were able to determine salary costs/day, non-salary costs/day, and variable costs/day by APR-DRG. From this information the hospital was able to establish a target for cost reduction: reduce length of stay for Medicare patients to align with the length of stay for non-Medicare patients with the same diagnosis (see Figure 7).

**Figure 7: Gastroenterology Differences Between Medicare and Non-Medicare Patients**

APR-DRG / NAME	Medicare Patients				All Other Patients				Total Patients				Projected Cost Savings	Projected LOS Decrease			
	MC SL Cases	LOS	Sal Cost / Day	Non Sal / Day	Variable / Day	Oth Cases	LOS	Sal Cost / Day	Non Sal / Day	Variable / Day	Total Cases	LOS			Sal Cost / Day	Non Sal / Day	Variable / Day
<b>Gastroenterology</b>																	
241 Total PEPTIC ULCER & GASTRITIS	44	3.93	380.66	198.66	579.31	19	3.68	1,248.81	664.31	1,913.12	63	3.86	1,421.92	745.86	2,167.78		
242 Total MAJOR ESOPHAGEAL DISORD	5	6.40	469.52	198.67	668.19	3	3.67	1,557.76	1,057.81	2,615.57	8	5.38	2,462.23	1,191.36	3,653.59		
243 Total OTHER ESOPHAGEAL DISORDE	7	9.71	288.81	119.14	407.95	9	3.44	1,503.68	1,112.14	2,615.82	16	6.19	2,073.25	1,131.94	3,205.19		
244 Total DIVERTICULITIS & DIVERTICUL	31	4.48	312.36	133.66	446.02	20	3.05	948.27	343.34	1,291.61	51	3.92	1,223.20	498.94	1,722.14		
245 Total INFLAMMATORY BOWEL DISEA	9	4.89	287.19	100.46	387.65	14	3.57	962.57	300.43	1,263.00	23	4.09	1,135.32	375.06	1,510.37		
246 Total GASTROINTESTINAL VASCULA	3	3.67	328.62	127.02	455.64	4	3.50	1,123.13	387.14	1,510.27	7	3.57	1,158.18	420.83	1,579.01		
247 Total INTESTINAL OBSTRUCTION	23	4.39	295.97	131.87	427.84	27	5.33	1,624.37	781.60	2,405.97	50	4.90	1,475.02	689.43	2,164.46	\$54,086.46	0.5
248 Total MAJOR GASTROINTESTINAL &	16	12.00	340.31	158.64	498.96	3	6.33	1,955.79	727.91	2,683.70	19	11.11	3,747.76	1,718.06	5,465.82	\$51,925.29	0.5
249 Total NON-BACTERIAL GASTROENTE	19	4.47	342.45	158.82	501.27	11	3.82	1,185.72	469.15	1,654.86	30	4.23	1,405.03	622.02	2,027.05	\$30,405.70	0.5
251 Total ABDOMINAL PAIN	8	3.13	334.11	105.35	439.47	12	3.67	1,064.26	356.96	1,421.22	20	3.45	1,056.20	345.87	1,402.06	\$14,020.64	0.5
252 Total MALFUNCTION REACTION & CC	7	4.00	398.49	211.01	609.50	7	3.71	1,058.06	576.23	1,634.29	14	3.86	1,326.02	710.13	2,036.15		
253 Total OTHER & UNSPECIFIED GASTR	31	4.39	408.87	261.75	670.61	8	2.38	943.81	506.64	1,450.46	39	3.97	1,619.40	1,016.68	2,636.08		
254 Total OTHER DIGESTIVE SYSTEM DIA	27	6.19	301.90	157.36	459.27	17	5.12	1,702.02	988.69	2,690.71	44	5.77	1,803.46	979.26	2,782.72	\$61,219.89	0.5
279 Total HEPATIC COMA & OTHER MAJC	6	3.17	423.19	195.03	618.22	10	5.20	1,991.79	777.75	2,769.54	16	4.44	1,747.41	717.69	2,465.10		
280 Total ALCOHOLIC LIVER DISEASE	4	10.00	324.48	142.52	466.99	7	4.57	1,763.30	1,042.00	2,805.30	11	6.55	2,302.01	1,181.34	3,483.35		
282 Total DISORDERS OF PANCREAS EX	32	6.44	327.49	163.63	491.12	21	4.10	1,281.84	467.36	1,749.20	53	5.51	1,780.77	821.19	2,601.96	\$68,951.94	0.5
283 Total OTHER DISORDERS OF THE LIV	4	9.25	405.18	196.60	601.78	5	6.20	2,541.73	1,254.21	3,795.94	9	7.56	3,077.80	1,505.04	4,582.85		
284 Total DISORDERS OF GALLBLADDER	4	3.00	372.82	980.86	1,353.68	14	4.50	1,864.89	2,035.69	3,700.57	18	4.17	1,543.46	2,237.22	3,780.68	\$34,026.08	0.5
663 Total OTHER ANEMIA & DISORDERS	1	6.00	291.77	102.03	393.80	-	-	-	-	-	1	6.00	1,750.59	612.18	2,362.77		
<b>Gastroenterology Total</b>	<b>281</b>	<b>5.41</b>	<b>341.72</b>	<b>173.37</b>	<b>515.09</b>	<b>211</b>	<b>4.18</b>	<b>1,390.97</b>	<b>737.95</b>	<b>2,128.93</b>	<b>492</b>	<b>4.88</b>	<b>1,652.96</b>	<b>852.44</b>	<b>2,505.40</b>	<b>\$314,635.99</b>	

### Tools

Tracking savings can be a difficult task because of how money flows through a health care system. The 90-day project team saw several examples of projects that claimed to have saved money, but actually had not when the finances were tracked. This type of cost savings is referred to as “light green dollars.”

### Getting Beyond “Light Green Dollars”

Typical experiences of quality improvement cost reduction efforts tend to result in claims that the clinical team generated savings. But these cost savings usually do not result in a reduced operating budget or reallocating savings to support other projects. As such, these savings are “light green” and cause great frustration for both the finance department and the clinical team; finance becomes skeptical of claims made by improvement teams, while the clinicians feel that their efforts go unrecognized and unrewarded. Outlined below are four case examples of “light green dollars” in different health care settings.

- Case 1: Academic Medical Network
  - A team working on reducing methicillin resistant *Staphylococcus aureus* (MRSA) infections claimed annual savings of \$1.9million from avoided costs due to improved infection control measures. However, \$1.9million was not “saved” in any tangible sense. The model assumed MRSA rates would continue to rise in line with historic trend, while actual costs were the costs incurred following improvement. The claimed \$1.9million “saved” represents the difference between actual and modeled costs. These savings are “light green dollars” since at no point was it possible to identify a budgetary saving and choose to reallocate or remove costs from the budget.
- Case 2: Academic Hospital
  - Improvement in the pneumonia care processes resulted in a switch from IV to oral antibiotics in 370 patients for supply cost “savings” of \$319,000. It is difficult to ‘see’ the savings because the year-on-year increase in drug costs meant that the savings were lost in annual cost increases. Without this improvement, total drug spending might indeed have been \$319,000 higher than it actually was in the subsequent year. However, to move from “light green dollars” to “dark green



dollars” the dollar amount saved arising from improvement needs to be identified and isolated within the budget. This allows a decision to be made on the reallocation or removal of this cost from the budget.

- Case 3: Academic Hospital
  - Pneumonia length of stay (LOS) was reduced by 1.3 days which enabled the hospital to refill beds for a claimed “savings” of \$250,000. While it may be true that refilling beds resulted in a revenue enhancement of \$250,000 without expanding fixed assets, (and hence greater operating efficiency), it is not appropriate to describe revenue enhancement as cost savings.
- Case 4: Public-Sector Provider Network
  - The provider network claimed \$84,000 in cost savings per month based on matching a length of stay (LOS) benchmark from elsewhere in the network. Since no improvement team was chartered and no changes were made with regard to the organization’s expenses, this was a purely theoretical exercise based on assumed “savings” after comparing this site to the network’s LOS benchmark.

#### *Finding Dark Green Dollars by Using Measurement Tools*

The 90-day project team did review waste reduction projects that did save money, but these projects failed to demonstrate the savings. The savings were “lost” within the cost accounting system such as when savings occurred in a department other than the one conducting the project (e.g., practices to improve nurse retention result in reduced overtime and agency costs on the ward, and also reduce the HR department’s costs to hire and train replacement staff). To identify savings and distinguish between “light green dollars” and “dark green dollars,” an agreed upon measurement method needs to be established. The three examples that follow highlight different measurement tools for tracking “dark green dollars.”

#### 1) Example 1: Using a Formula to Track “Dark Green Dollars”

In their article, Nolan and Bisognano (Nolan T, Bisognano M. Finding the balance between quality and cost. *Healthcare Financial Management*. Apr 2006;60(4):66-72.) outlined two formulae to help organizations assess the impact of improvement efforts on different aspects of their hospital’s costs. The first formula focuses on labor costs because health care is a labor-intensive industry:

$$\text{Total wages/admission} = (\text{Average wage/hour}) \times (\text{Worked hours/patient day}) \times (\text{Patient days/admission})$$

By breaking down the ratio of total wages/admission into its separate components, different sources of waste are identified (see Table 9 for examples of waste).

**Table 9: Sources of Waste Uncovered by Examining Components of Total Wages/Admission**

Total Wages/ Admission	Average Wage/Hour	Worked Hours/Patient Day	Patient Days/Admission
	<p>“The costs associated with recurring and training new nurses to fill vacant positions.”  <b>Primary Driver:</b> Staffing  <b>Secondary Driver:</b> Turnover/Recruitment</p>	<p>“Inappropriate staff time in the ICU because a patient is unable to be discharged to a lower-acuity unit due to problems with the discharge of patients from these units.”  <b>Primary Driver:</b> Flow  <b>Secondary Driver:</b> Hospital Throughput</p>	<p>“Excess patient days because of delays in discharge because of poor coordination of the processes associated with discharge.”  <b>Primary Driver:</b> Clinical Quality Problems  <b>Secondary Driver:</b> Coordination of Care</p>
	<p>“The increased cost associated with contract labor such as nurses from a temporary agency because of vacancies for full-time staff.”  <b>Primary Driver:</b> Staffing  <b>Secondary Driver:</b> Turnover/Recruitment</p>	<p>“Hours in excess of budgeted hours because of the uneven workload between days of the week due to scheduling of surgery cases without regard to the impact on downstream resources.”  <b>Primary Driver:</b> Flow  <b>Secondary Driver:</b> Hospital Throughput</p>	<p>“Excess patient days because of a lack of setting and executing daily goals for the patient and the care team to accelerate the recovery of patients.”  <b>Primary Driver:</b> Clinical Quality Problems  <b>Secondary Driver:</b> Coordination of Care</p>
	<p>“The premium pay associated with overtime or last minute scheduling of nurses due to inadequate planning.”  <b>Primary Driver:</b> Staffing  <b>Secondary Driver:</b> Premium Pay</p>	<p>“Hours in excess of budget because of failure to predict demand a day or two ahead and match staffing appropriately.”  <b>Primary Driver:</b> Flow  <b>Secondary Driver:</b> Match Capacity to Demand</p>	<p>“Excess patient days associated with an adverse event or complication.”  <b>Primary Driver:</b> Clinical Quality Problems  <b>Secondary Driver:</b> Adverse Events and Complications</p>
	<p>“Overtime pay associated with failure to complete the day’s surgery schedule on time.”  <b>Primary Driver:</b> Flow  <b>Secondary Driver:</b> Hospital Throughput</p>		

*All examples were taken from Nolan and Bisognano article cited above.*

In addition to labor costs, medication costs are a substantial expense during a patient’s hospital stay. Nolan and Bisognano created the following equation to track savings in these areas:

$$\text{Total medication costs/admission} = (\text{Average cost/dose}) \times (\text{Number of doses/admission})$$

As with the labor cost equation above, it is important to break down the different components of total medical costs/admission to highlight potential waste (see Table 10).

**Table 10:** Sources of Waste Identified by Examining Components of Total Medication Costs/Admission

Total Medication Costs/Admission	Average Cost/Dose	Number of Doses/Admission
	<p>“Excess cost of brand medications when generics are available.”  <b>Primary Driver:</b> Supply Chain  <b>Secondary Driver:</b> Pharmaceuticals</p>	<p>“Excess cost associated with failure to stop medications appropriately (for example, continuing prophylactic use of antibiotics for longer than 24 hours after surgery).”  <b>Primary Driver:</b> Supply Chain  <b>Secondary Driver:</b> Wasted Materials</p>
	<p>“Excess cost associated with failure to make a timely switch from expensive administration routes to less expensive ones (for example, switching from IV to oral administration of antibiotics for patients with pneumonia).”  <b>Primary Driver:</b> Supply Chain  <b>Secondary Driver:</b> Pharmaceuticals</p>	<p>“The cost associated with treating adverse events (for example, the use of medications to reverse oversedation).”  <b>Primary Driver:</b> Clinical Quality Problems  <b>Secondary Driver:</b> Adverse Events and Complications</p>
	<p>“Excess cost associated with overuse of expensive medications when less expensive ones are available.”  <b>Primary Driver:</b> Supply Chain  <b>Secondary Driver:</b> Pharmaceuticals</p>	

*All examples were taken from Nolan and Bisognano article cited above.*

These equations can be modified to fit the organization’s waste reduction portfolio of work.

## 2) Example 2: Use a Matched Case Study to Identify “Dark Green Dollars”

Identifying savings in a project focused on the Clinical Quality Problems driver can be difficult. One organization began a quality improvement project to reduce surgical site infections (SSIs). After a successful project resulted in a decrease in SSIs, they looked for a way to explore cost savings from this initiative. They identified 16 patients who had an SSI and whose increased hospital costs could be tied to the SSI. To the best of their ability, they then matched the SSI patients to patients who did not have an SSI—based on surgery, age, diagnoses, and other conditions—and reviewed their costs. The result was an average incremental cost per SSI of \$27,288 (see Table 11). The top five cost categories that made up this incremental cost were:

- Room and Board (including nursing)
- Pharmacy
- Surgical (revisits to the operating room)
- Radiology
- Other Ancillary

The aggregate number of hospital days for patients with an SSI was 240 days: 74 of these days occurred before the SSIs and 166 days occurred after the SSIs. The aggregate number of hospital days for the matched patients (who did not have an SSI) was 70 days. Therefore the difference between the aggregate number of days for patients with an SSI and the aggregate number of days

for patients without an SSI was 170 days. The aggregate cost for the patients with an SSI was \$843,299, of which \$376,863 was incurred prior to the SSIs and \$466,436 was incurred after the SSIs. The aggregate incurred cost for the matched patients was \$406,692 resulting in a \$436,607 difference between the two groups. The difference between the two groups with respect to the average adjusted length of stay per patient was 10.6 days. Using this comparative information, the hospital was able to determine that the average cost of an SSI was \$27,288.

**Table 11: SSI Study – Overall Results and Incremental Costs**

	Aggregate 16 Patients		Average per Case (n=16)	
	Hospital Days	Costs	ALOS	Costs
<b>Pre-SSI</b>	74	\$376,863	4.6	\$23,554
<b>Post-SSI</b>	166	\$466,436	10.4	\$29,152
<b>Total-SSI</b>	240	\$843,299	15.0	\$52,706
<b>Total-Match</b>	70	\$406,692	4.4	\$25,418
<b>Total Difference</b>	170	\$436,607	10.6	\$27,288
<b>% Difference</b>	243%	107%	243%	107%

From fiscal year 2005 to fiscal year 2006, this organization had 33 fewer Class I and Class II SSI cases. Therefore the annual costs savings from reducing SSIs was \$900,504 (33 cases x \$27,288 cost per case). These savings could be further broken down using the Bisognano and Nolan equations. Specifically, differences would be highlighted in the patient days/admission component of the labor equation and the number of doses/admission component of the medication costs equation.

### 3) Example 3: Using a Tool from Outside of Health Care to Identify “Dark Green Dollars”

Sigma Aldrich is the world’s largest supplier of research biochemicals, organic chemicals and kits, in addition to being a major supplier to the pharmaceutical industry. Sigma Aldrich saves approximately 2% each year and has developed a simple Excel worksheet that can be used in any division, in any plant, in any country to track their savings. This tool works by comparing expenses in the area of interest to expenses incurred the year prior and adjusting for wage increases and productivity/volume changes. It then allows the organization to track any investments made with the savings accrued. There are nine steps to complete this worksheet (see Figure 8), as follows:

1. Complete the "Department, Location, Currency and Prepared By" information in upper right corner.
2. Select the reporting month from drop-down menu.
3. Select the appropriate account(s) from the drop down menu where savings has occurred.
4. From your department/location expense reports, record the year-to-date (YTD) expense from this year and last year for the appropriate month.
5. For savings in Payroll costs, input the estimated annual wage increase for the current year.
6. Input your productivity measure amounts for this year and last year. Remember to use the YTD amounts for the month selected in instruction #2.
7. Complete the details of savings for each significant process improvement project.
8. Complete the details of reinvestments from savings achieved in project.
9. Briefly describe the unit of measure for the productivity measure used in step six.

By using this tool across all projects, savings can be compiled regardless of the area of improvement. Furthermore, by requiring that the details of the savings are written out in terms of process improvement, this tool reinforces that the goal is not traditional cost-cutting but rather waste removal through redesign. Finally, a key to identifying “dark green dollars” is to make a concerted decision as to how the funds will be reinvested; this tool creates a public space for that decision. IHI adapted Sigma Aldrich’s Savings Tracker Worksheet to fit the appropriate components for tracking health care delivery costs (see Figure 8).

**Figure 8: Quality Improvement Savings Tracker Worksheet (Adopted from Sigma Aldrich) – Hospital Flow Project (electronic version available as well)**

**Savings Tracker Worksheet: Hospital Flow Example**

(Adapted from Sigma Aldrich Process Improvement Savings Worksheet)

Step 1: Department:   
 Location:   
 Currency:   
 Prepared by:

Step 2. Select Reporting Month ==>		Step 4			Step 5				Step 6				Run Rate + Productivity Savings
1/31/2006		FY2004	FY2005	2005	Adj. for Annual Wage Increase		2005	Productivity/Volume Measure Adj.			2005		
Step 3. Select account where savings occurred	Account Code	YTD Actual	YTD Actual	Savings	Wage Incr %	Wage Adj. to Savings	2005 Adjusted	2005 Savings	FY 2004 Volume	FY 2005 Volume	Volume Factor	2005 Savings	
not applicable	N/A	18450000	18545875	-95875		0	18545875	-95875	12929	14018	1.08	1554030	1458155
not applicable	N/A	0	0	0	0	0	0	0	0	0	0	0	0
not applicable	N/A	0	0	0	0	0	0	0	0	0	0	0	0
not applicable	N/A	0	0	0	0	0	0	0	0	0	0	0	0
not applicable	N/A	0	0	0	0	0	0	0	0	0	0	0	0
not applicable	N/A	0	0	0	0	0	0	0	0	0	0	0	0
		<b>Total Actual Savings</b>		<b>\$ (95,875)</b>	<b>Total Run-rate Savings</b>		<b>\$ (95,875)</b>	<b>Total Productivity Savings</b>			<b>\$ 1,554,030</b>	<b>\$ 1,458,155</b>	

**Step 7. Process Improvement Savings Detail**

List/Describe Major Improvements or Changes	YTD Savings Contribution
1 IHI Flow concepts	\$ 1,458,155
2	
3	
4	
5	-
6	-
7	-
8	-
<b>Total Estimate YTD Savings \$ 1,458,155</b>	

**Step 8. Savings Reinvested or Lost**

List/Describe Major Reinvestments or Lost Savings	YTD Reinvestment Amount
1	
2	-
3	-
4	-
5	-
6	-
7	-
8	-
<b>Total Estimate YTD Lost or Reinvested Savings \$ -</b>	

**Difference from amount reported above \$ (0)**

One health care organization that has worked with IHI for several years to improve patient flow through their system has achieved “dark green dollar” savings. The hospital tracked their progress using several measures; one key measure for tracking flow is adjusted bed turns (i.e., the number of times functional beds turn over during a specified time period adjusted by Case Mix Index). As a result of their improvement efforts they saw a 15.2% improvement from FY 2002-2005 in their yearly adjusted bed turns. Table 12 highlights their improvement for one fiscal year.

**Table 12: Cost per Bed Turn (FY 2004 – FY 2005)**

	Adjusted Turns	Actual Turns	Beds	Total Paid Hours	Paid Hours per Actual Turn	Cost per Actual Turn
<b>FY 2004</b>	89	60.7	213	738,000	57.1	\$1,425
<b>FY 2005</b>	96.7	65.2	215	741,835	52.9	\$1,313

The “dark green dollars” derived from this work to improve flow result from the increase in productivity that was possible by removing waste in the hospital. Using the Savings Tracker Worksheet, it is possible to establish the “dark green dollars” generated (see Figure 8). From FY 2004 for FY 2005, this hospital increased their salary and wages by \$95,875; this wage increase needs to be considered when calculating “dark green dollars.” By improving flow through their hospital, patient volume increased from 12,929 in FY 2004 to 14,018 in FY 2005, resulting in a 1.08 increase in volume. This 1.08 increase in volume translates into \$1,554,030 [FY 2004 Salary and Wages – (1 + (1-Volume Factor)) x FY 2004 Salary and Wages]. By subtracting the increase in Salary and Wages (\$95,875) from the 2005 savings generated by the volume increase (\$1,554,030) the hospital generated \$1,458,155 in “dark green dollars.”

### **Conclusions:**

1. A great deal has been learned from this 90-day project about the following:
  - What providers are currently doing to reduce waste/cost and which providers are most likely to be pioneers in this area;
  - The barriers that must be overcome to successfully focus on waste reduction in health care delivery and possible intervention points;
  - How to communicate a Kano 2 approach to waste reduction in health care;
  - The tools that are helpful for tracking “dark green dollars;” and
  - What it would take for IHI to be able to successfully support providers in waste reduction efforts and at a scale that addresses the financial side of the improvement challenge.
  
2. In the medium- and long-term, the most successful providers must deliver not only high quality care, but also do so with minimum waste. It is likely that over time, competitive forces will lead to prices falling in healthcare as is typical in other industries. Cost control will become ever more part of the quality conversation.

However, in the short-term (and especially since hospitals are currently enjoying relatively high profitability) it is particularly challenging for hospitals to place the required organizational and leadership focus on cost control, even for those organizations which are pioneers in the field.

### **Research and Development Team:**

- Leader: Lindsay Martin
- Co-leaders:
  - Maureen Bisognano
  - Tom Nolan
- Team Members
  - James Mountford
  - Charles Neumann