Key Performance Indicators in Radiology

The Future of Medical Imaging: Trends and Perspectives
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Business Intelligence

Entails assembling financial and non-financial metrics that help guide an organization in achieving its mission and goals

Critical to managing a practice or department
Turning Data Into Business Intelligence

• What metrics are most important in managing and measuring success?

• I.e., what are the *Key Performance Indicators* (KPIs) for the organization?

• How are these metrics best presented?

• How can these KPIs be used to help close the gap between the current state and organizational goals?
Q#1: Are the terms “Business Intelligence” and “KPIs” used in your organization?
Determine what to monitor and measure i.e., What are the KPIs?
Define KPI criteria and assign responsibilities
Define goals—what does success look like?
Identify data sources
Determine frequency of KPI measurement
Obtain data
Measure and monitor KPI performance over time
Develop methods for KPI data presentation
Use KPI information to help bring about change to achieve strategy and goals
Step #1: Determine What To Measure--Key Performance Indicators (KPIs)

• KPIs should reflect what is important to the organization

• Engage stakeholders to identify KPIs

• Focus on areas where there are:
  • Known gaps between performance and strategic goals
  • Ongoing compliance requirements
  • Clear organizational expectations
    • Financial performance
    • Service
    • Quality and safety
    • …

• Recognize that it is impractical, if not impossible, to measure everything or even too many things simultaneously
Step #1: Typical Categories Of Indictors

• Quality and safety

• Stakeholder satisfaction— patients, employees, referring physicians

• Operations— efficiency, utilization, timeliness

• Finance
Step #1: Functional Types Of Indicators

- **Structure** (context)—physical facilities, equipment, staffing levels, staff training
- **Process** (transactions) – steps in the care process: diagnostic and therapeutic
- **Outcome** (effects) – change in health status, complications, stakeholder satisfaction

*The Donabedian Model of Care Evaluation*

Donabedian, A. The quality of care: How can it be assessed? JAMA 1988; 260 (12): 1743–8
Examples of Functional KPIs For Radiology

- **Structure**
  - Installed equipment base by type
  - Age of equipment
  - Number of FTEs
  - Level of specialization
  - Licensure and certification

- **Process**
  - Incident reporting rates
  - Equipment utilization rates
  - Report turnaround times
  - Compliance with hand hygiene policies
  - Procedure volume
    - By day, week, month
    - Trended over time by month, year
  - Billed charges versus budget
    - MTD
    - YTD

- **Outcome**
  - Operating margin
  - Error rates
  - Complication rates, accidents
  - Patient satisfaction
  - Employee satisfaction
Multi-functional teams asked to identify KPIs in each important area of activity
• 143 potential KPIs identified by the teams in the original brainstorming process

• Modified Delphi process used to prioritize and decrease the list
Q#2: What is an example of an important KPI in your practice or company?
Step #2: Define KPIs And Goals: Assign Responsibilities

• Define all terms
  • All percentages must have a defined numerator and denominator

• Identify person responsible for the curation and validation of each KPI

• Assign each KPI to a major category—Finance, stakeholders, operations, Q&S

• Identify end users accountable for each KPI E.g.:
  • Financial—Hospital Executives, Department Chair, Department Administrators, Operations managers
  • Physician productivity—Division or Section Heads, Chairman
  • Equipment utilization—Modality lead physician, Department administrators, Operations managers, Service engineers
Step #2: Goals and Benchmarks

• Identify/ establish goals related to each KPI– what constitutes success?
  • Financial– do better than plan
  • Hand hygiene >90% compliance, Universal protocol compliance—100%
  • Stakeholder satisfaction– positive trend
  • Complications– do better than benchmarks with decreasing trend

• Identify benchmark sources for comparison, if available
  • Society of Chairmen of Academic Radiology Departments surveys for physician productivity
  • Literature reports
  • Joint Commission standard
  • Industry standards—computer up time
Massachusetts General Hospital template for defining KPIs, setting goals and assigning responsibilities

<table>
<thead>
<tr>
<th>Section</th>
<th>Information</th>
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<tbody>
<tr>
<td><strong>Definition:</strong></td>
<td>The usage of hand hygiene before and after patient contact</td>
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<tr>
<td><strong>Owner:</strong></td>
<td>Karen Miguel</td>
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<tr>
<td><strong>Accountability:</strong></td>
<td>QSC; SO; Ops Manager</td>
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<td><strong>Metric Source:</strong></td>
<td>Joint Commission NPSG</td>
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<tr>
<td><strong>Units:</strong></td>
<td>% Compliant</td>
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<tr>
<td><strong>Norm:</strong></td>
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<tr>
<td><strong>Target:</strong></td>
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<td><strong>Numerator:</strong></td>
<td>Sum of Compliant Observations</td>
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<td><strong>Denominator:</strong></td>
<td>Sum of Observations</td>
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<tr>
<td><strong>Data Source:</strong></td>
<td>CQS</td>
</tr>
<tr>
<td><strong>Reporting Cycle:</strong></td>
<td>Monthly</td>
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</table>
Q#3: Is there a standard process in your organization for defining KPIs and assigning responsibility?
Q#4: Does your organization have a template for defining KPIs?
Step #3: Identify Sources Of Data

- **EHR**
  - Patient demographics
  - Patient diagnoses
- **RIS**
  - Appointment availability
  - Procedure volume
  - Report turn-around times
  - Equipment utilization rates
  - Patient waiting times
  - Physician productivity
  - Unread case volumes
- **PACS**
  - Images/case
- **Per event reporting**
  - Morbidity and mortality conference
  - Complications
  - Deaths
- **Direct observation**
  - Hand hygiene

![Graphs and charts related to data sources and measurement metrics.](image-url)
Step #3: Identify Sources Of Data

- **Surveys**
  - Patient satisfaction
  - Employee satisfaction
  - Referring physician satisfaction

- **Hospital safety reporting system**
  - Incident reporting—slips and falls

- **Administrative compliance record reviews**
  - Universal protocol adherence
  - Standardized reporting issues

- **Hospital administrative and Human Resource systems**
  - Educational module compliance
  - Licensure
  - CME compliance
  - Vaccination compliance

- **Financial systems**
  - Billings and collections
  - Resource utilization by category
  - Operating margin
Step 4: Develop Presentation Methods

- Charts, spreadsheets, graphs
- Heatmaps
- Dashboards
- Balanced Scorecards
  - Summary of multiple parameters
- Trend indicators
  - Arrows for short term versus goal
  - Graphs for long term
- Color coding
  - Green - meets goal
  - Yellow - close to goal
  - Red - not meeting goal
- Drill down/Roll up capability

Use of KPIs is most effective when users can see what they need to know at a glance and easily drill down.
The value and use of data are highly influenced by the timing of its availability.

Step #3 Determine Frequency of Measurement (Reporting Cycle) and Trending

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Measurements</th>
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<tbody>
<tr>
<td>Real-time</td>
<td>Unread case volume by division, by modality, Time to next exam</td>
</tr>
<tr>
<td>Daily</td>
<td>Case volume by type, Appointment availability</td>
</tr>
<tr>
<td>Monthly</td>
<td>Financial indicators, Compliance with hand hygiene and universal protocol, Case complications</td>
</tr>
<tr>
<td>Yearly</td>
<td>Annual financial results, Physician productivity, Patient satisfaction</td>
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</tbody>
</table>
Real-time Monitoring of Work

Unread exams in MSK division- for different modalities

Allows on-line rebalancing of radiologists deployment
Real-time monitoring of predicted outpatient wait times

Tuesday, September 25, 2018 2:40 PM

Walk-In Patients

<table>
<thead>
<tr>
<th>Modality</th>
<th>Location</th>
<th>Patients Waiting</th>
<th>Anticipated Wait</th>
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<tbody>
<tr>
<td>X-ray</td>
<td>Yawkey 6</td>
<td>0</td>
<td>3 min</td>
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Scheduled Appointments

<table>
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<tr>
<th>Modality</th>
<th>Location</th>
<th>Anticipated Delay</th>
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<tbody>
<tr>
<td>CT</td>
<td>Yawkey 6</td>
<td>5 min</td>
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<td>MRI</td>
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<td>Ultrasound</td>
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<tr>
<td>Procedures</td>
<td>Yawkey 6</td>
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Your actual wait time may vary based on the complexity of the previous exam and resource availability.

Information provided to patients on monitors in waiting rooms

Available in real-time to managers throughout department via intranet

Powered by an AI program that takes into account multiple parameters
Daily Reporting of Outpatient Appointment Availability; Days to 40%, 60%, 80%

- 40% = 6 days
- 60% = 10 days
- 80% = 19 days
“Heat” Calendar -- Division
Heat Map of Equipment Age/Useful Life
Annual Summary In Departmental Capital Request

More than 3 years of useful life 53/157
Will be beyond useful life guidelines within 3 years 41/157
Beyond useful life per guidelines 43/157
18/157 approved replacements
Balanced Scorecards

- Both a management concept and a data presentation method
- Designed to link data presentation to strategy and goals
- Hierarchical presentation with “drill down” capability—summary level to granular detail
- Should be tailored to each organization’s needs
  - KPIs that reflect success factors for the business that link to strategic direction
  - “Gap-to-goal” data at a glance

Vision and strategy

Mission
Why we exist

Values
What is important to us

Vision
What we want to be

Strategy
Our game plan

Strategy Map
Translate the strategy to action

Balanced Scorecard
Measure and focus

Finance:
How will we maintain a positive margin?

Operations:
How will we implement best practices?

Stakeholders:
How will we satisfy stakeholders?

Quality and safety:
How will we improve quality?

Adapted and modified from Kaplan and Norton.
The Balanced Scorecard and Strategy Maps,
Harvard Business Review Press, Boston, MA
Q#5: Does your organization have a business intelligence dashboard or Balanced Scorecard?
**MGH Departmental Primary Dashboard (Balanced Scorecard) Using The 6 US National Academy of Medicine Categories of Quality And 18 Roll Up KPIs**

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
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<td></td>
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<td>99.00</td>
<td>%</td>
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<td>Employee Satisfaction Survey</td>
<td>Last Year</td>
<td>61.10</td>
<td>68.47</td>
<td>%</td>
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</table>
Hierarchical Presentation Of Business Intelligence Data: Role Up And Drill Down

- **Granular level detail:** dozens of potential indicators
- **Dashboard level indicators:** < 20
- **Strategic Categories:** 4-6
Dashboard Level Roll UP Indicators

Organizational strategic focus

Financial

Quality & Safety

Stakeholder

Quality of Clinical Service

Operational

Patient Experience

Supporting Functions

Department management focus

Core Functions

Department management focus

Referring MD & Staff Satisfaction

Employee Satisfaction

Patient Satisfaction
**Drill Down Example: Hand Hygiene**

**Department level summary**

<table>
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<tr>
<th>Period</th>
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<th>Trend</th>
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**Timely**

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**Effective**

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**Patient Centered**

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<tbody>
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<td>68.47%</td>
<td>%</td>
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</table>
Drill Down Example:
Hand Hygiene Compliance KPI In Each Practice Unit
Steps 5: Use KPIs To Improve Performance
Report Turn-Around-Time

$ Incentive
(Point where incentives were given for meeting targets for report signing times)

Online KPI Dashboard
(Point where online dashboard started providing feedback)

70% decrease
over 8 months
Q7: Have you improved a process through use of KPIs?

Share and example...
Dos and Don’ts
Do

- Prioritize the most important KPIs
- Use KPIs to obtain *actionable* business intelligence
- Periodically review the importance of each KPI
  - Areas needing attention change over time
- Try to mitigate the burden of data collection
  - Automate data collection as much as possible
- Hold people accountable for them and to them
  - Training is key
    - Interpretation
    - Cause and effect relationships
Don’t

• Try to measure everything all the time

• Overwhelm the organization with too many KPIs

• Create an overly expensive and time wasting system for KPIs

• Rely on KPIs out of larger context
  • Common sense trumps numbers every time
Pitfalls

• KPI process becomes regarded as just another pro forma administrative burden and not used for intended purposes

• Missing what’s important to measure what is easy to measure
  • “Not everything that counts can be counted, and not everything that can be counted counts” Sociologist, William Bruce Cameron-- 1963

• Misinterpreting KPI results
  • Productivity between high RVU versus low RVU subspecialties--pediatrics versus neuroradiology
  • Not correcting costs to reflect variances in volume
Pitfalls

• Failure to understand balance between KPIs
  • Patient satisfaction versus quality of care – on line mammography versus accuracy of interpretations

• Reliance on KPIs can result in unintended consequences
  • Physician productivity and performance,
    • Cherry picking of easier cases
    • Avoidance of risky procedures to reduce incidents requiring reporting
  • Adverse resource management to meet expense budget
    • Understocking with “stock outs”
Conclusions

• Used correctly KPIs can help in achieving organizational goals

• KPIs should be adapted to each organization’s situation

• The benefits of KPI use must be balanced against the time and cost to acquire and analyze them

• Leaders and managers should be trained in how to turn KPI based business intelligence into action but...

• KPIs are ultimately just another management tool and should be placed in context