

|              |  |
|--------------|--|
| TEAM ID      | PNT2022TMID28702                             |
| PROJECT NAME | ANALYTICS FOR HOSPITALS HEALTH- CARE<br>DATA |

|                              |
|------------------------------|
| <b>CONTENT</b>               |
| Performance Metrics          |
| 1) Model Performance Metrics |

# HEALTHCARE PERFORMANCE MEASUREMENTS

Spearhead hospital and health system improvements by using standardized data and analytics on a variety of topics

## **what are healthcare performance measurements**

Healthcare performance measurements are aggregated, quantified and analyzed data on a particular healthcare- related activity.

Their purpose is to identify opportunities for reducing costs, improving quality of care and increasing efficiency of care delivery.

They're also used to monitor other initiatives that an institution wants to track- or needs to track- to satisfy regulatory requirements.

These measurement initiatives are typically developed and operated with the active involvement of the physicians and hospital staff whose performance is being measured- as well as government and other third- party agencies- to ensure that the measures are meaningful, and the data are accurate.

**Types of healthcare performance measurements include:**

- 1) Quality and efficiency of patient care
- 2) Cost of healthcare services
- 3) Disparities in performance
- 4) Care outcomes

Level of safety and adherence to governmentally- mandated standards There are many reasons why healthcare performance measurements are important to healthcare institutions and society,

- Good health is more important to people than most other goods or services.
- Governments and individuals spend a lot on healthcare.
- People want to make informed decisions about their healthcare.
- Governments bodies can make better healthcare polices.

### **Using software for healthcare performance measurements,**

In 2009, the US government created a USD 27billion incentive program to encourage healthcare providers to adopt EHRs.

## **Prioritizing healthcare performance measurements- which are more important?**

- 1)Length of stay
- 2)Readmission rates
- 3)Mortality rates
- 4)Hospital incidents
- 5)CMS program performance initiatives
- 6)Average cost per discharge
- 7)operating margin
- 8)Bad debt

### **IBM Watson Health Solutions,**

IBM, through its Watson health solutions, has been a

leader in providing solutions for clinical quality measures and quality reporting for core measures.

It has a track record of accurate, on- time submissions- making it a leader for the CMS Hospital Inpatient Quality Reporting Program (HIQRP) or for accreditation from the joint commission (TJC).

**Table 1: National Performance Comparisons (All Hospitals in Study)**

| Table 1: National Performance Comparisons (All Hospitals in Study) |  |                               |                             |                                    |                    |                           |
|--|--|-------------------------------|-----------------------------|------------------------------------|--------------------|---------------------------|
| Domain   | Performance Measures                           | Medians                       |                             | Benchmark Compared With Peer Group |                    |                           |
|  |  | Benchmark Hospitals (Winners) | Peer Hospitals (Nonwinners) | Difference                         | Percent Difference | Comments                  |
| Clinical Outcomes  | Inpatient Mortality Index <sup>1</sup>         | 0.77                          | 0.99                        | -0.22                              | -22.3%             | Lower mortality           |
|  | Complications Index <sup>1</sup>               | 0.73                          | 0.92                        | -0.18                              | -20.1%             | Fewer complications       |
|  | HAI Index <sup>2</sup>                         | 0.60                          | 0.69                        | -0.09                              | -13.1%             | Fewer infections          |
| Extended Outcomes  | 30-Day Mortality Rate <sup>3</sup>             | 11.6                          | 12.3                        | -0.7                               | n/a <sup>7</sup>   | Lower 30-day mortality    |
|  | 30-Day Hosp-Wide Readmission Rate <sup>4</sup> | 15.0                          | 15.6                        | -0.6                               | n/a <sup>7</sup>   | Fewer 30-day readmissions |
| Operational Efficiency   | Average Length of Stay <sup>1</sup>            | 4.4                           | 4.7                         | -0.4                               | -7.7%              | Shorter stays             |
|  | ED Throughput Measure <sup>5</sup>             | 111.3                         | 131.0                       | -19.8                              | -15.1%             | Less time to service      |
|  | Inpatient Expense per Discharge <sup>6</sup>   | \$6,186                       | \$7,190                     | -\$1,004                           | -14.0%             | Lower inpatient cost      |
|  | Medicare Spend per Beneficiary <sup>5</sup>    | 0.96                          | 0.99                        | -0.03                              | -3.4%              | Lower Episode Cost        |
| Financial Health   | Operating Profit Margin <sup>6</sup>           | 15.8                          | 4.0                         | 11.8                               | n/a <sup>7</sup>   | Higher profitability      |
| Patient Experience   | HCAHPS Top Box (%) <sup>5</sup>                | 77.0                          | 71.0                        | 6.0                                | n/a <sup>7</sup>   | Better patient experience |

**Table 2: Major Teaching Hospital Performance Comparisons**

| Table 2: Major Teaching Hospital Performance Comparisons |  |                               |                             |                                    |                    |                           |
|--|--|-------------------------------|-----------------------------|------------------------------------|--------------------|---------------------------|
| Domain   | Performance Measures                           | Medians                       |                             | Benchmark Compared With Peer Group |                    |                           |
|  |  | Benchmark Hospitals (Winners) | Peer Hospitals (Nonwinners) | Difference                         | Percent Difference | Comments                  |
| Clinical Outcomes  | Inpatient Mortality Index <sup>1</sup>         | 0.91                          | 1.00                        | -0.09                              | -9.2%              | Lower mortality           |
|  | Complications Index <sup>1</sup>               | 0.94                          | 0.97                        | -0.03                              | -2.9%              | Fewer complications       |
|  | HAI Index <sup>2</sup>                         | 0.64                          | 0.82                        | -0.19                              | -22.9%             | Fewer infections          |
| Extended Outcomes  | 30-Day Mortality Rate <sup>3</sup>             | 11.5                          | 12.0                        | -0.5                               | n/a <sup>7</sup>   | Lower 30-day mortality    |
|  | 30-Day Hosp-Wide Readmission Rate <sup>4</sup> | 15.1                          | 16.2                        | -1.1                               | n/a <sup>7</sup>   | Fewer 30-day readmissions |
| Operational Efficiency                                   | Average Length of Stay <sup>1</sup>            | 4.4                           | 5.0                         | -0.6                               | -11.5%             | Shorter stays             |
|  | ED Throughput Measure <sup>5</sup>             | 161.0                         | 205.0                       | -44.0                              | -21.5%             | Less time to service      |
|  | Inpatient Expense per Discharge <sup>6</sup>   | \$6,420                       | \$8,456                     | -\$2,036                           | -24.1%             | Lower inpatient cost      |
|  | Medicare Spend per Beneficiary <sup>5</sup>    | 0.97                          | 1.01                        | -0.04                              | -3.5%              | Lower Episode Cost        |
| Financial Health   | Operating Profit Margin <sup>6</sup>           | 11.7                          | 3.8                         | 7.9                                | n/a <sup>7</sup>   | Higher profitability      |
| Patient Experience                                       | HCAHPS Top Box (%) <sup>5</sup>                | 77.0                          | 71.0                        | 6.0                                | n/a <sup>7</sup>   | Better patient experience |



**Table 4: Large Community Hospital Performance Comparisons**

| Table 4: Large Community Hospital Performance Comparisons |  |                               |                             |                                    |                    |                           |
|---|--|-------------------------------|-----------------------------|------------------------------------|--------------------|---------------------------|
| Domain  | Performance Measures                           | Medians                       |                             | Benchmark Compared With Peer Group |                    |                           |
|   |  | Benchmark Hospitals (Winners) | Peer Hospitals (Nonwinners) | Difference                         | Percent Difference | Comments                  |
| Clinical Outcomes   | Inpatient Mortality Index <sup>1</sup>         | 0.79                          | 1.02                        | -0.23                              | -22.1%             | Lower mortality           |
|   | Complications Index <sup>1</sup>               | 0.86                          | 0.99                        | -0.13                              | -13.0%             | Fewer complications       |
|   | HAI Index <sup>2</sup>                         | 0.57                          | 0.68                        | -0.10                              | -15.2%             | Fewer infections          |
| Extended Outcomes   | 30-Day Mortality Rate <sup>3</sup>             | 11.6                          | 12.4                        | -0.8                               | n/a <sup>7</sup>   | Lower 30-day mortality    |
|   | 30-Day Hosp-Wide Readmission Rate <sup>4</sup> | 15.2                          | 15.5                        | -0.3                               | n/a <sup>7</sup>   | Fewer 30-day readmissions |
| Operational Efficiency                                    | Average Length of Stay <sup>1</sup>            | 4.7                           | 5.0                         | -0.3                               | -6.0%              | Shorter stays             |
|   | ED Throughput Measure <sup>5</sup>             | 122.5                         | 148.3                       | -25.8                              | -17.4%             | Less time to service      |
|   | Inpatient Expense per Discharge <sup>6</sup>   | \$6,373                       | \$6,786                     | -\$412                             | -6.1%              | Lower inpatient cost      |
|   | Medicare Spend per Beneficiary <sup>5</sup>    | 1.00                          | 1.01                        | -0.01                              | -1.1%              | Lower Episode Cost        |
| Financial Health  | Operating Profit Margin <sup>6</sup>           | 15.0                          | 6.6                         | 8.4                                | n/a <sup>7</sup>   | Higher profitability      |
| Patient Experience  | HCAHPS Top Box (%) <sup>5</sup>                | 79.0                          | 70.0                        | 9.0                                | n/a <sup>7</sup>   | Better patient experience |

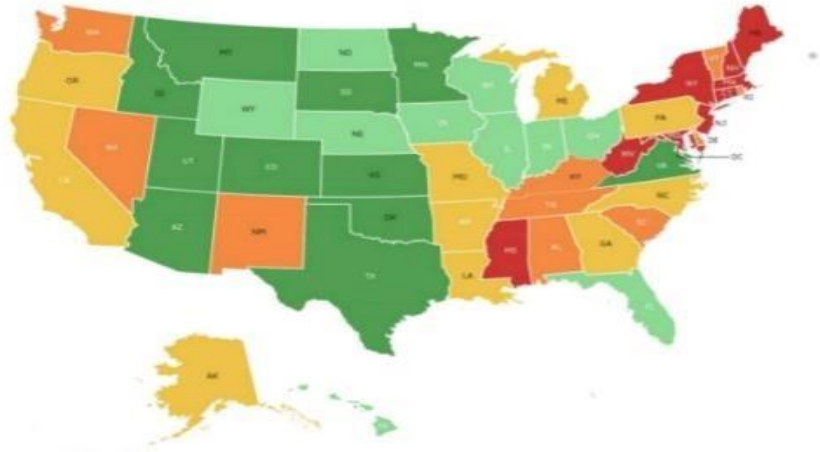
**Table 5: Medium Community Hospital Performance Comparisons**

| Table 5: Medium Community Hospital Performance Comparisons |  |                               |                             |                                    |                    |                           |
|--|--|-------------------------------|-----------------------------|------------------------------------|--------------------|---------------------------|
| Domain   | Performance Measures                           | Medians                       |                             | Benchmark Compared With Peer Group |                    |                           |
|  |  | Benchmark Hospitals (Winners) | Peer Hospitals (Nonwinners) | Difference                         | Percent Difference | Comments                  |
| Clinical Outcomes  | Inpatient Mortality Index <sup>1</sup>         | 0.74                          | 0.98                        | -0.23                              | -23.8%             | Lower mortality           |
|  | Complications Index <sup>1</sup>               | 0.77                          | 0.98                        | -0.21                              | -21.5%             | Fewer complications       |
|  | HAI Index <sup>2</sup>                         | 0.54                          | 0.61                        | -0.07                              | -11.5%             | Fewer infections          |
| Extended Outcomes  | 30-Day Mortality Rate <sup>3</sup>             | 11.4                          | 12.3                        | -0.8                               | n/a <sup>7</sup>   | Lower 30-day mortality    |
|  | 30-Day Hosp-Wide Readmission Rate <sup>4</sup> | 14.8                          | 15.6                        | -0.8                               | n/a <sup>7</sup>   | Fewer 30-day readmissions |
| Operational Efficiency                                     | Average Length of Stay <sup>1</sup>            | 4.4                           | 4.9                         | -0.5                               | -9.9%              | Shorter stays             |
|  | ED Throughput Measure <sup>5</sup>             | 103.8                         | 131.3                       | -27.5                              | -21.0%             | Less time to service      |
|  | Inpatient Expense per Discharge <sup>6</sup>   | \$5,896                       | \$6,869                     | -\$973                             | -14.2%             | Lower inpatient cost      |
|  | Medicare Spend per Beneficiary <sup>3</sup>    | 0.95                          | 0.99                        | -0.05                              | -4.6%              | Lower Episode Cost        |
| Financial Health   | Operating Profit Margin <sup>6</sup>           | 14.8                          | 4.7                         | 10.1                               | n/a <sup>7</sup>   | Higher profitability      |
| Patient Experience   | HCAHPS Top Box (%) <sup>5</sup>                | 76.5                          | 70.0                        | 6.5                                | n/a <sup>7</sup>   | Better patient experience |

**Table 6: Small Community Hospital Comparisons**

| Table 6: Small Community Hospital Comparisons |  |                               |                             |                                    |                    |                           |
|---|--|-------------------------------|-----------------------------|------------------------------------|--------------------|---------------------------|
| Domain  | Performance Measures                           | Medians                       |                             | Benchmark Compared With Peer Group |                    |                           |
|   |  | Benchmark Hospitals (Winners) | Peer Hospitals (Nonwinners) | Difference                         | Percent Difference | Comments                  |
| Clinical Outcomes                             | Inpatient Mortality Index <sup>1</sup>         | 0.51                          | 1.00                        | -0.49                              | -49.2%             | Lower mortality           |
|   | Complications Index <sup>1</sup>               | 0.58                          | 0.90                        | -0.32                              | -35.1%             | Fewer complications       |
|   | HAI Index <sup>2</sup>                         | n/a                           | n/a                         | n/a                                | n/a                | n/a                       |
| Extended Outcomes                             | 30-Day Mortality Rate <sup>3</sup>             | 11.6                          | 12.4                        | -0.8                               | n/a <sup>7</sup>   | Lower 30-day mortality    |
|   | 30-Day Hosp-Wide Readmission Rate <sup>4</sup> | 14.7                          | 15.4                        | -0.7                               | n/a <sup>7</sup>   | Fewer 30-day readmissions |
| Operational Efficiency                        | Average Length of Stay <sup>1</sup>            | 4.3                           | 4.9                         | -0.6                               | -13.0%             | Shorter stays             |
|   | ED Throughput Measure <sup>5</sup>             | 93.8                          | 100.5                       | -6.8                               | -6.7%              | Less time to service      |
|   | Inpatient Expense per Discharge <sup>6</sup>   | \$6,344                       | \$7,577                     | -\$1,233                           | -16.3%             | Lower inpatient cost      |
|   | Medicare Spend per Beneficiary <sup>5</sup>    | 0.90                          | 0.96                        | -0.06                              | -6.1%              | Lower Episode Cost        |
| Financial Health                              | Operating Profit Margin <sup>6</sup>           | 17.2                          | 1.7                         | 15.5                               | n/a <sup>7</sup>   | Higher profitability      |
| Patient Experience                            | HCAHPS Top Box (%) <sup>5</sup>                | 76.5                          | 73.0                        | 3.5                                | n/a <sup>7</sup>   | Better patient experience |





100 Top Hospitals performance  
2020 study state-level rankings

- Quintile 1 - Best
- Quintile 2
- Quintile 3
- Quintile 4
- Quintile 5 - Worst



| Northeast     |                | Midwest       |                | South         |                | West          |                |
|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
| Current Study | Previous Study | Current Study | Previous Study | Current Study | Previous Study | Current Study | Previous Study |
| CT            | CT             | IL            | IL             | AL            | AL             | AK            | AK             |
| ME            | ME             | IN            | IN             | AR            | AR             | AZ            | AZ             |
| MA            | MA             | IA            | IA             | DE            | DE             | CA            | CA             |
| NH            | NH             | KS            | KS             | DC            | DC             | CO            | CO             |
| NJ            | NJ             | MI            | MI             | FL            | FL             | HI            | HI             |
| NY            | NY             | MN            | MN             | GA            | GA             | ID            | ID             |
| PA            | PA             | MO            | MO             | KY            | KY             | MT            | MT             |
| RI            | RI             | NE            | NE             | LA            | LA             | NV            | NV             |
| VT            | VT             | ND            | ND             | MD            | MD             | NM            | NM             |
|               |                | OH            | OH             | MS            | MS             | OR            | OR             |
|               |                | SD            | SD             | NC            | NC             | UT            | UT             |
|               |                | WI            | WI             | OK            | OK             | WA            | WA             |
|               |                |               |                | SC            | SC             | WY            | WY             |
|               |                |               |                | TN            | TN             |               |                |
|               |                |               |                | TX            | TX             |               |                |
|               |                |               |                | VA            | VA             |               |                |
|               |                |               |                | WV            | WV             |               |                |

## **Model Performance Metrics,**

Most model- performance measures are based on the comparison of the models predictions with the (known) values of the dependent variable in a dataset.

## **Performance Metrics In Healthcare,**

A healthcare key performance indicator (KPI) or metric is a well- defined performance measure that is used to observe, analyse, optimize, and transform a health process to increase satisfaction for both patients and healthcare providers alike.