

Data Analysis and Display



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Data Collection, Analysis and Display

The PDCA Cycle

- **Plan** (What is the question you want to answer, what data is available, develop a data collection plan, etc.)
- **Do** (implement your plan and collect data)
- **Check** (continue to collect data to see if your plan and implementation are working)
- **Act** (standardize your improvement, continue to monitor to ensure continued compliance and/or additional improvement)

Where to start?

- **Data Collection plan**

- What is the question you are trying to answer?
- What data is available to answer that question?
- Is the data available electronically?
- If the data has to be collected manually, consider collecting the data concurrently.
- How much data do you need?
- Who will collect the data?

Data collection plan....

- When will the data be collected?
- Who will compile and analyze the data?
- Will the data be displayed graphically or in a table?
- What is the “data definition”. Write it out.
- Take your time on this step. It can make or break your improvement project!

Stop Here!

- Review the previous information on developing a data collection plan!
- Make sure you are collecting good data and that you have taken time to ensure that your data definition is clear. If multiple staff will be recording data, make sure they understand the data elements. Consider a short pilot to make sure data definition is clear.

Basic Display Tools

- *Run Charts*
- *Bar Graphs*
- *Pie Charts*
- *Pareto Charts*
- *Histograms*
- *Checksheets*
- Control Charts (need at least 16 data points)

Sample Checksheet

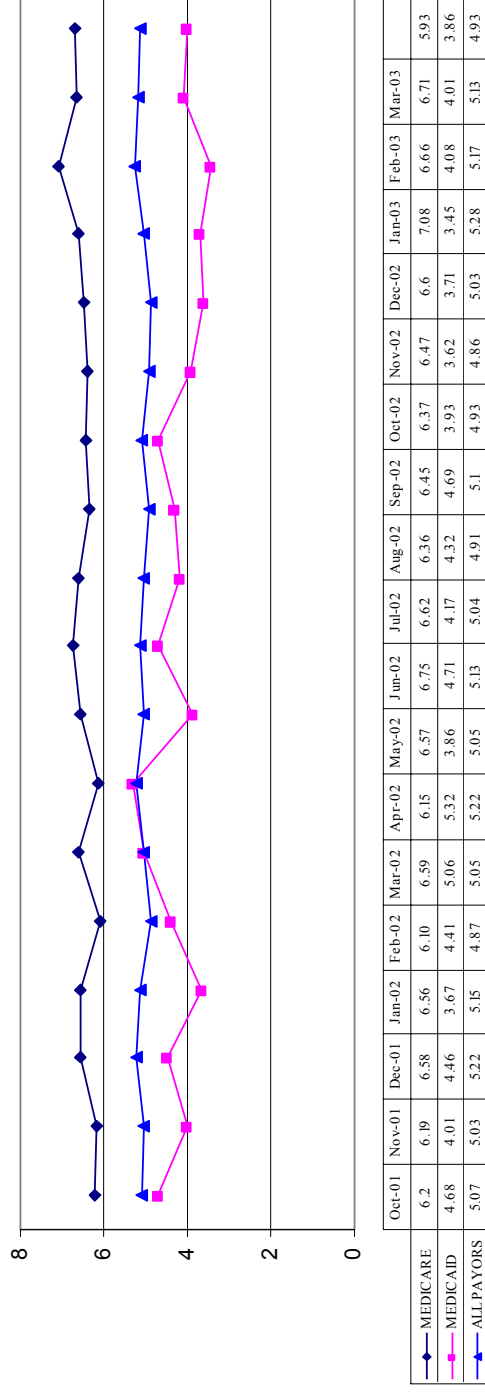
OR Date	MR #	PACU Adm pain score	PACU D/C pain score	PACU narcotics, Y/N?	Floor Meds

Data Table

<u>Year</u>	<u>Total Pts</u>	<u>TotalHrs</u>	<u>AVGLOS</u>	<u>Bed DelayPts</u>	<u>Bed Delay Hrs</u>	<u>Bed AVG LOS</u>	<u>% of Bed Delay Pts</u>
2000	8012	14344.03	1.79	1400.00	2825.50	2.02	17.47%
2001	8254	15356.87	1.93	1830.00	3281.18	1.79	22.17%
2002	7695	14495.92	1.88	2026.00	3752.42	1.85	26.33%
2003	7537	14900.00	1.98	2170.00	4411.33	2.03	28.79%
2004(YTD)	1820	3621.00	1.99	552.00	1165.00	2.11	30.33%
2004 (Project ed)	7280.00	14484.00	1.99	2208.00	4660.00	2.11	30.33%

Run Chart

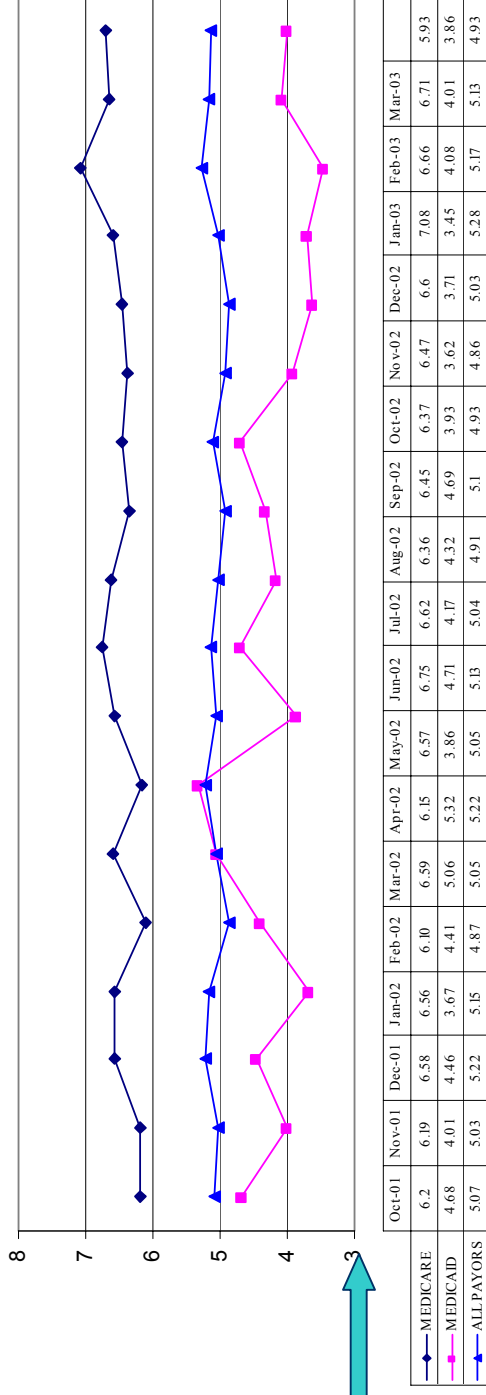
Length of Stay By Payor Excludes Newborns



Add data source

Run Chart with new scale

**Length of Stay By Payor
Excludes Newborns**



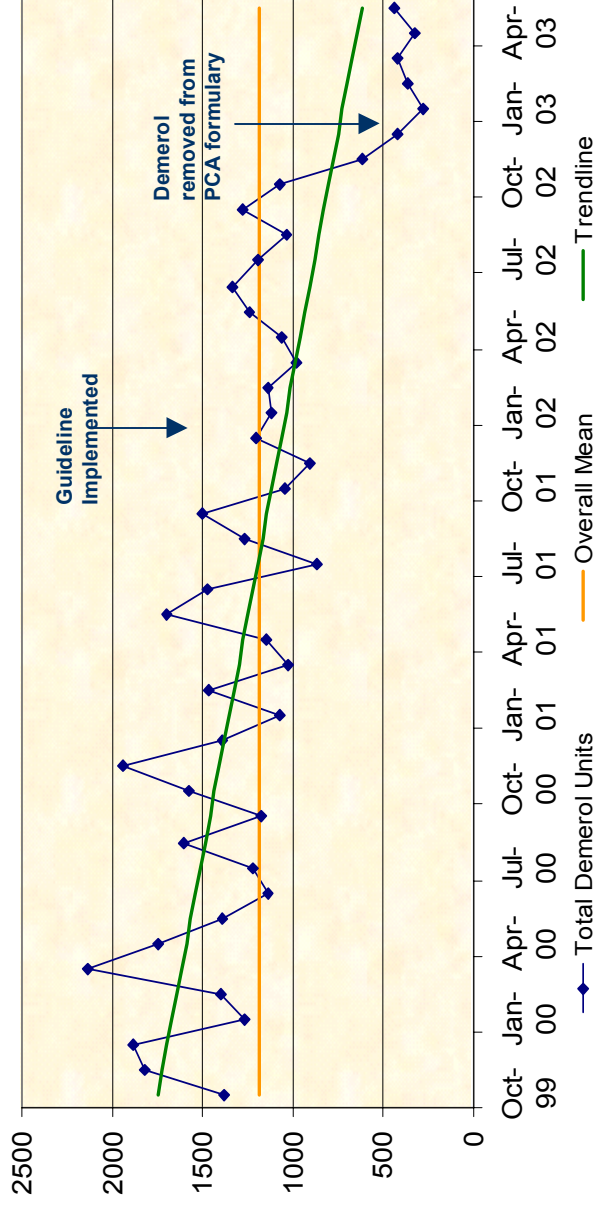
**New
Scale**

Sample Run Chart

Total Demerol Units per Discharge Month: Anywhere USA Hospital

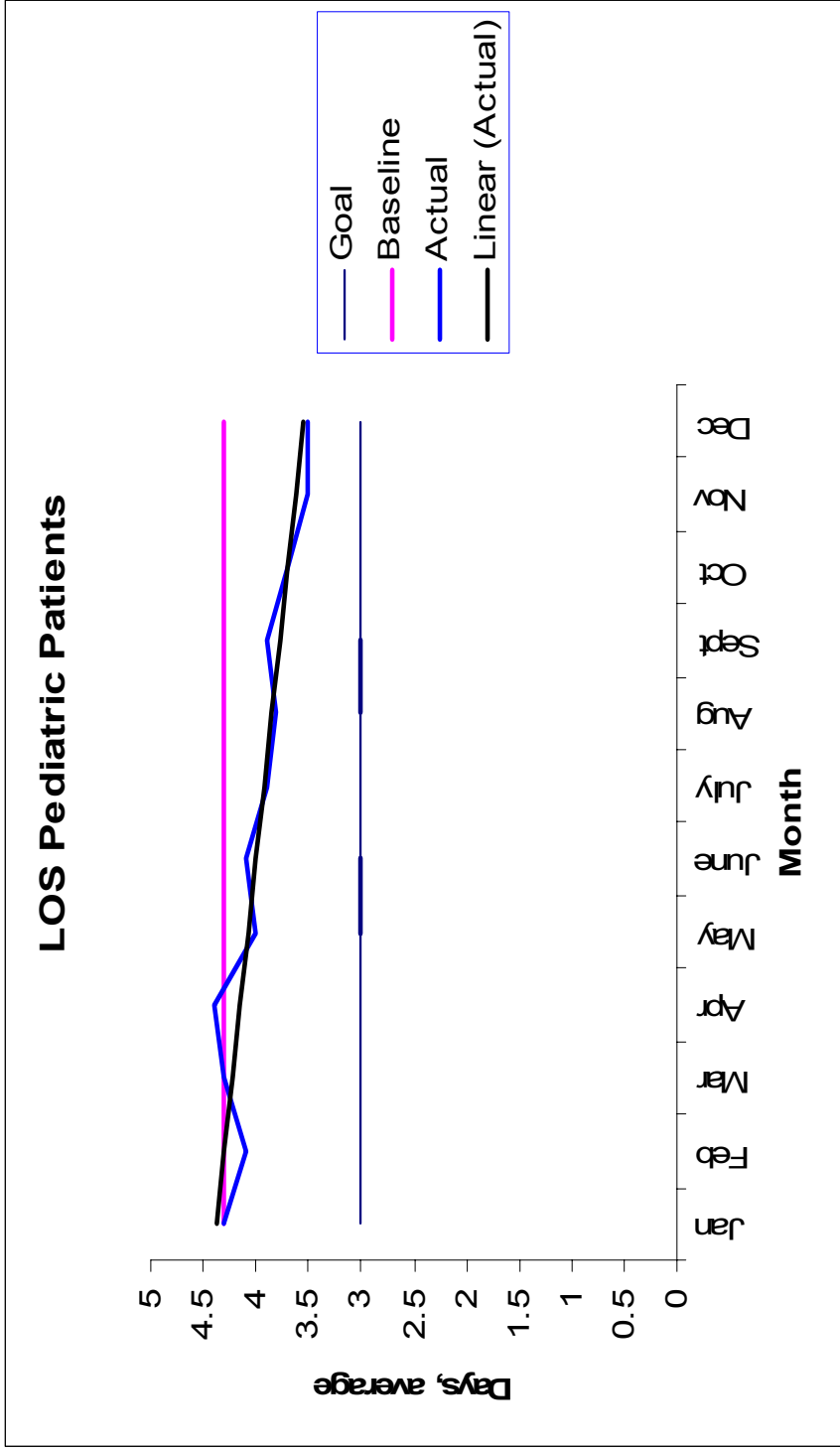
Sample Criteria: Pt's rec'd >1 Demerol Unit (any mode) and LOS > 48 Hours (n=52,059)

Resource: American Pain Society Guidelines: Acute Pain < 48 hours: 1999

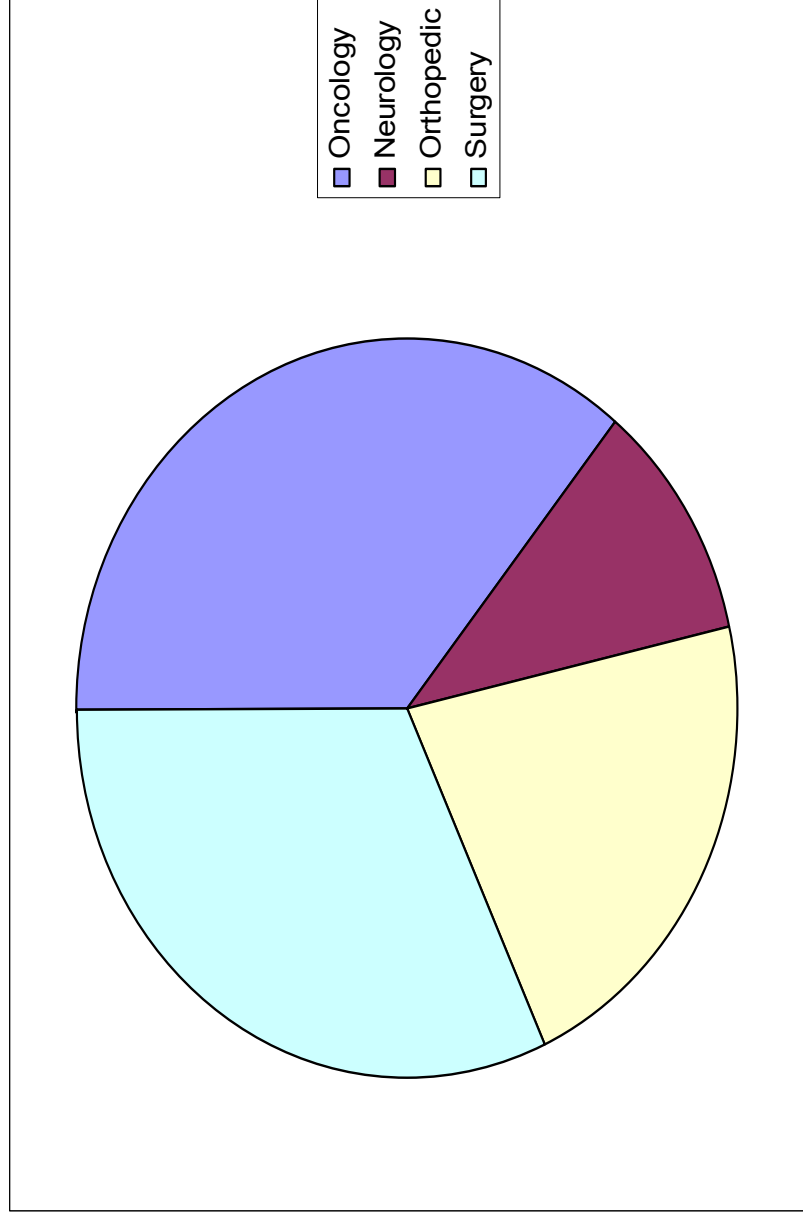


Data Source: Trendstar / CDM Codes: Demerol Units C.L. Jones, Aug 2003

Run Chart with Goal, Baseline, and trendline

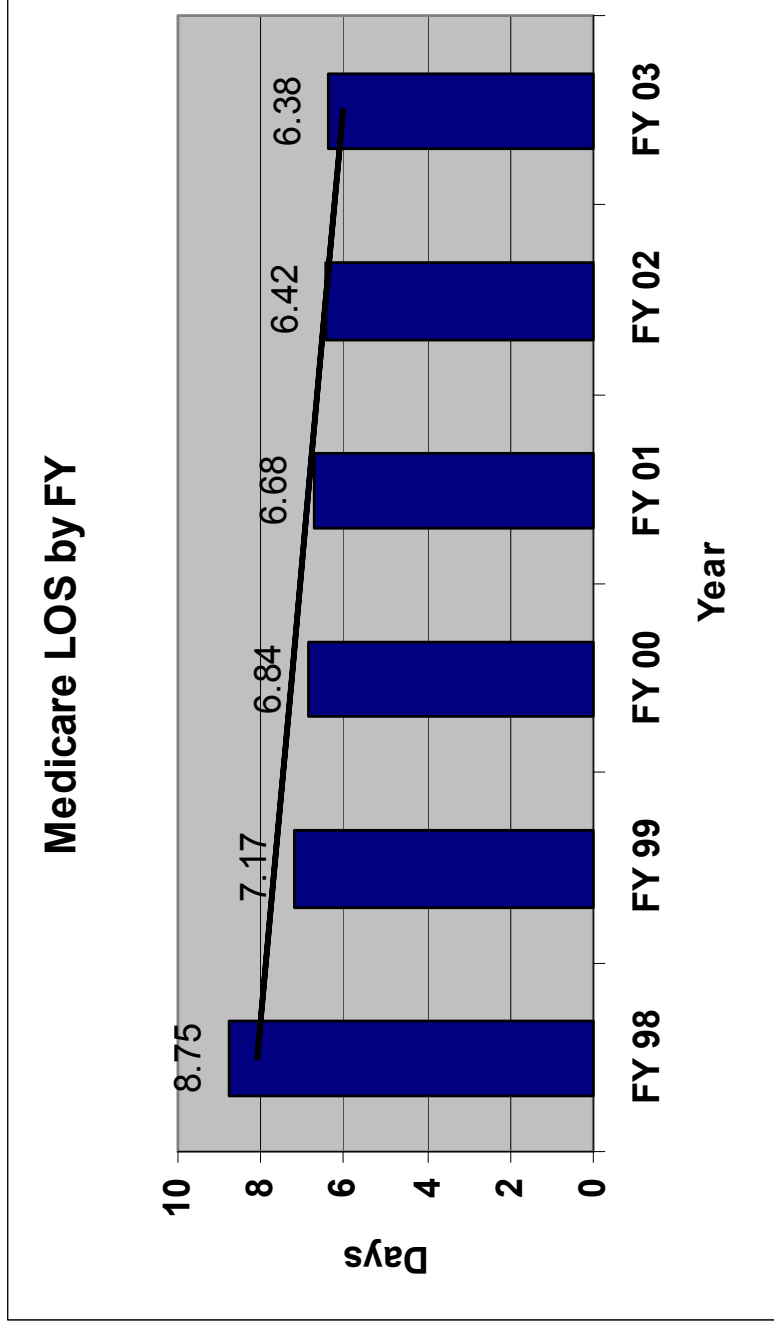


Pie Chart, Patient Types on Unit

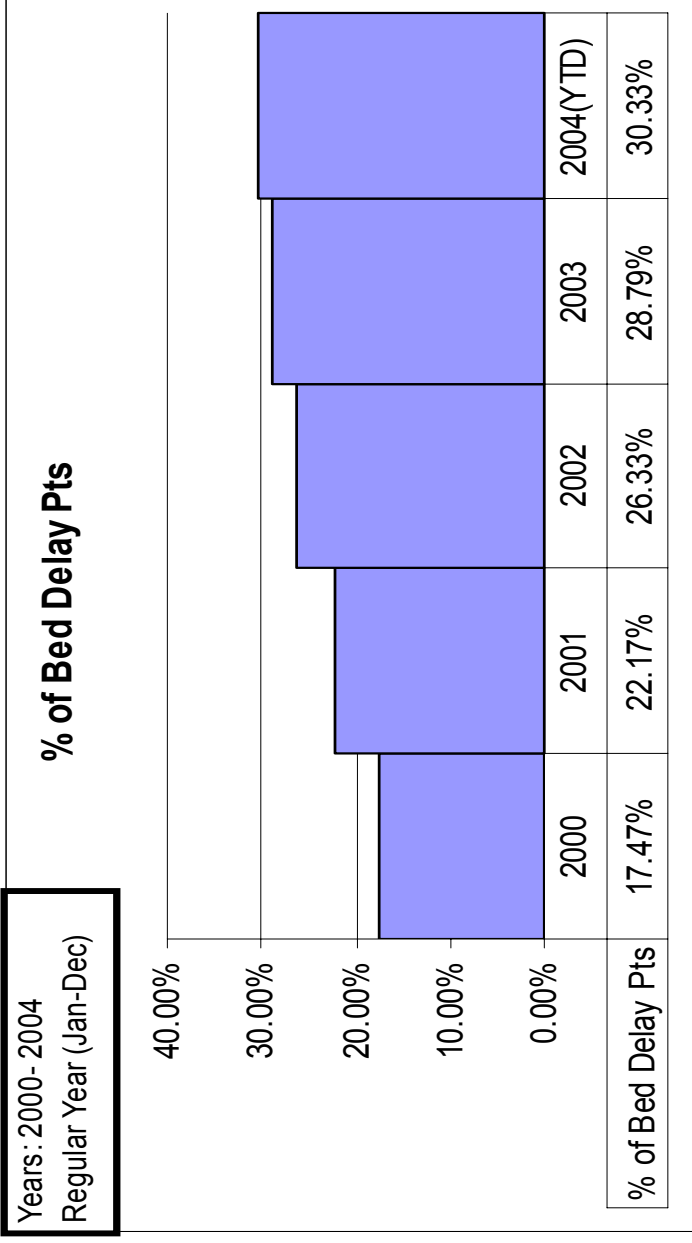


First Quarter 2004, Census data for 4th floor

Bar Chart

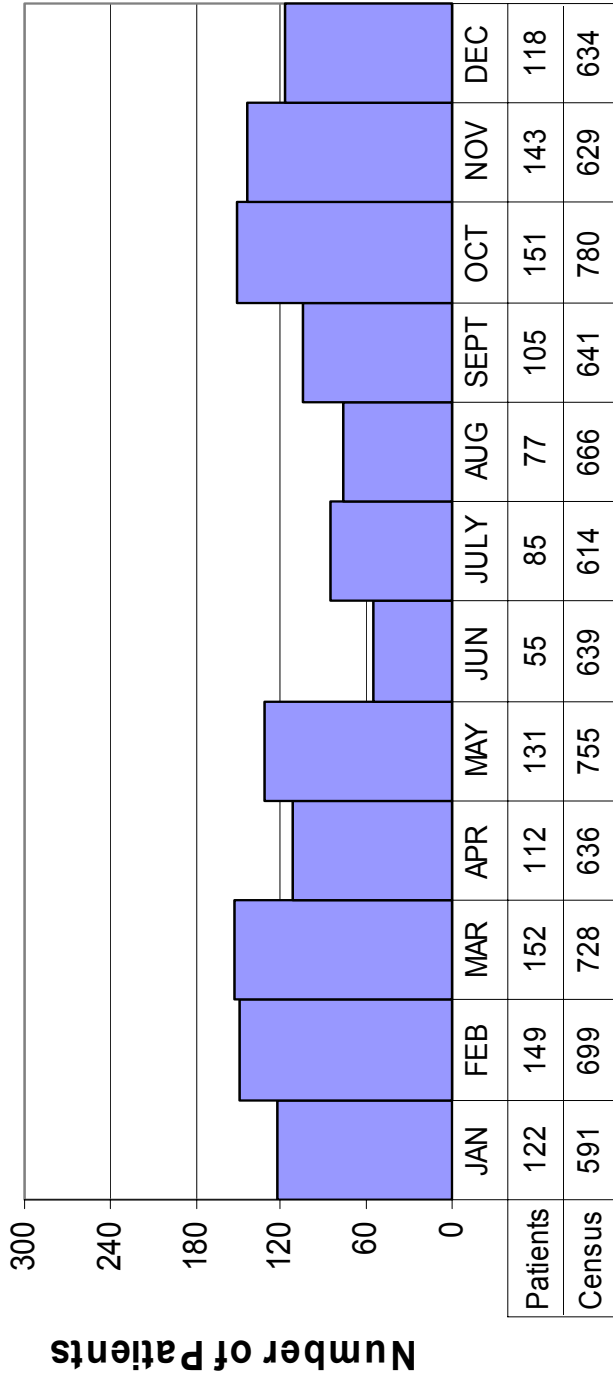


Sample Histogram



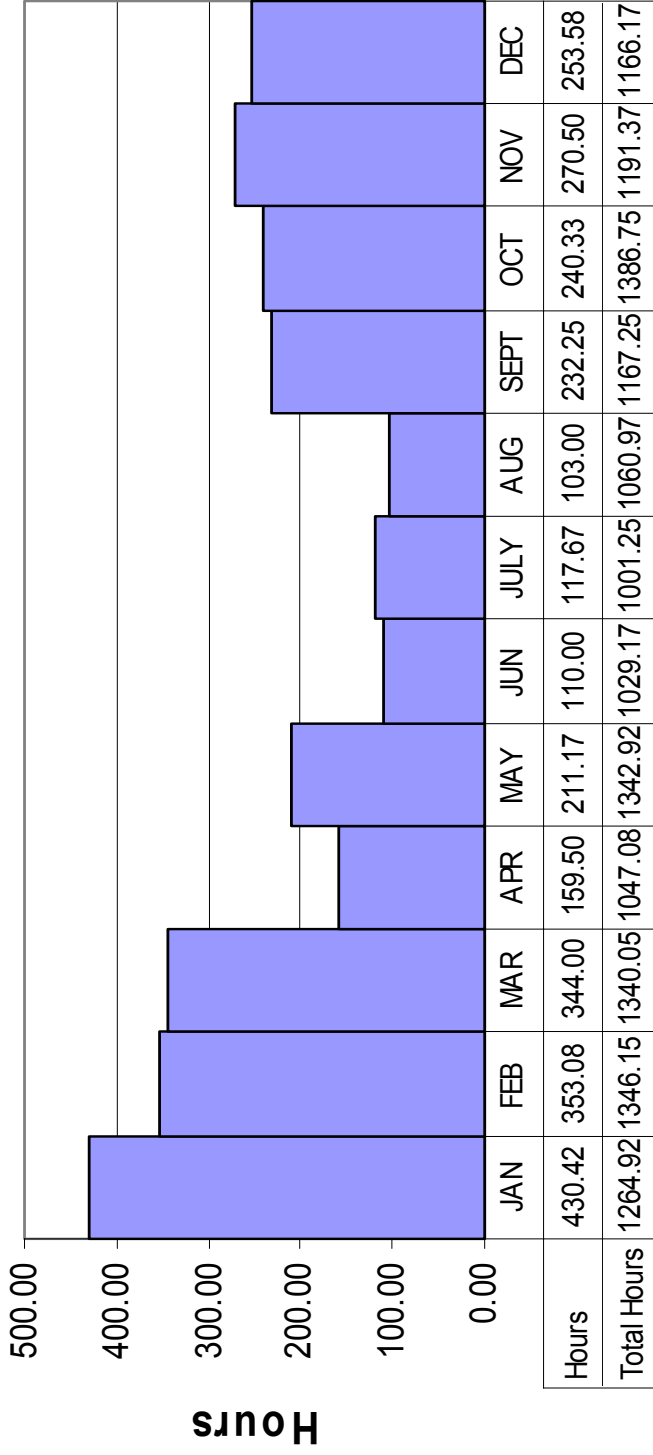
Histogram

Bed Delay Patients for Jan. 01, 2000 to Dec. 31, 2000



Histogram

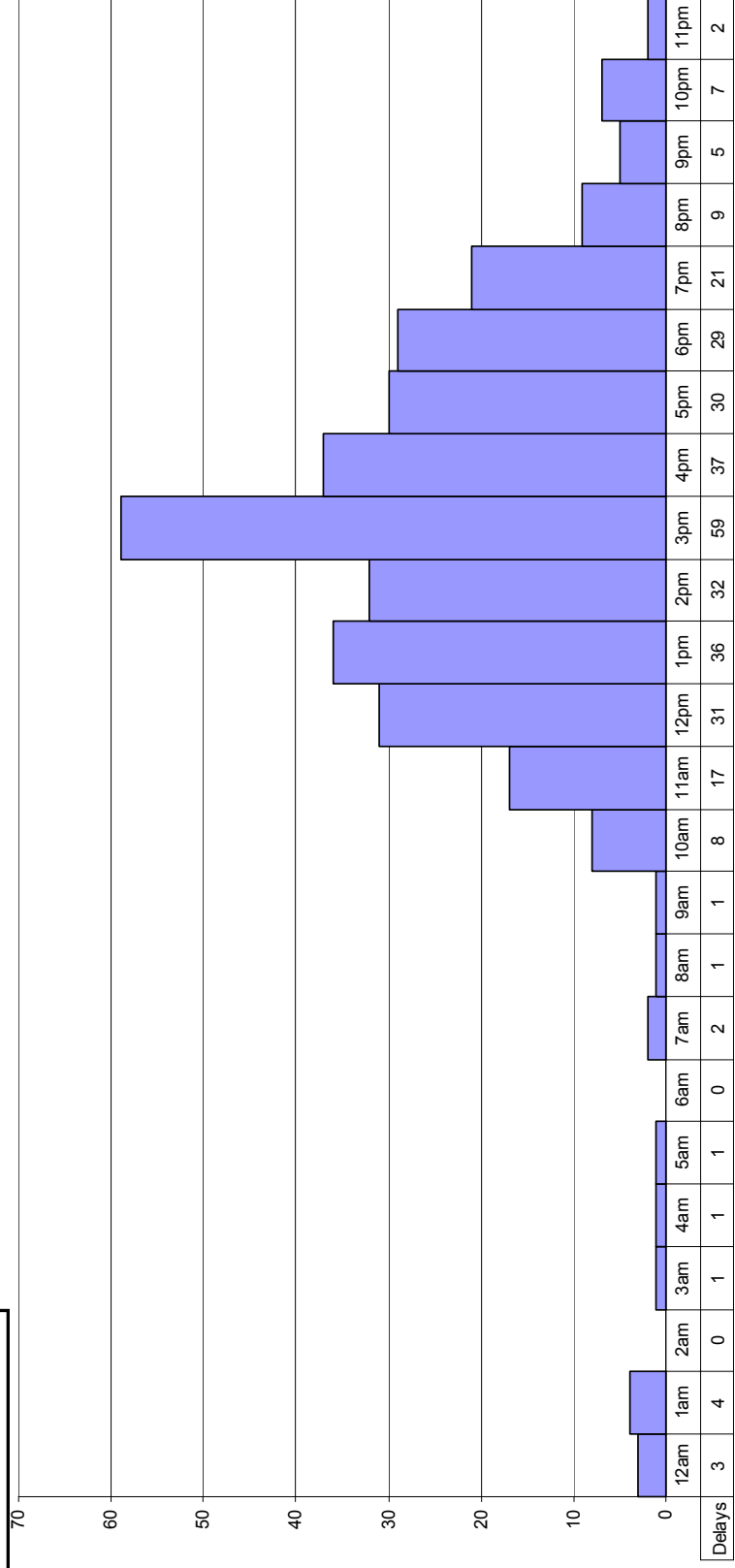
Bed Delay Hours of Care for Jan. 01, 2000 to Dec. 31, 2000



Histogram

Source:
April/May 2004
PACU Patient Log

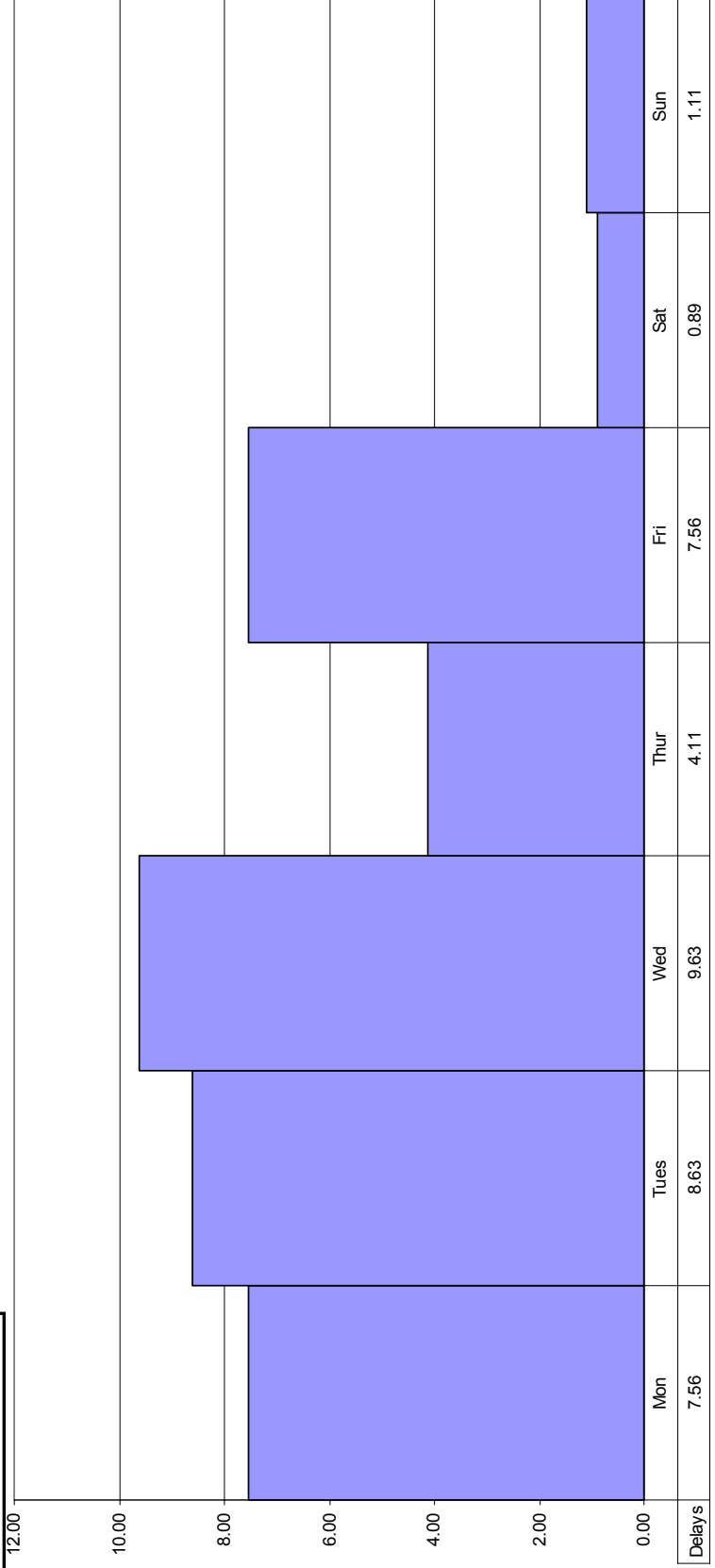
PACU Delays by Hour of Day based on PACU out Time



Histogram

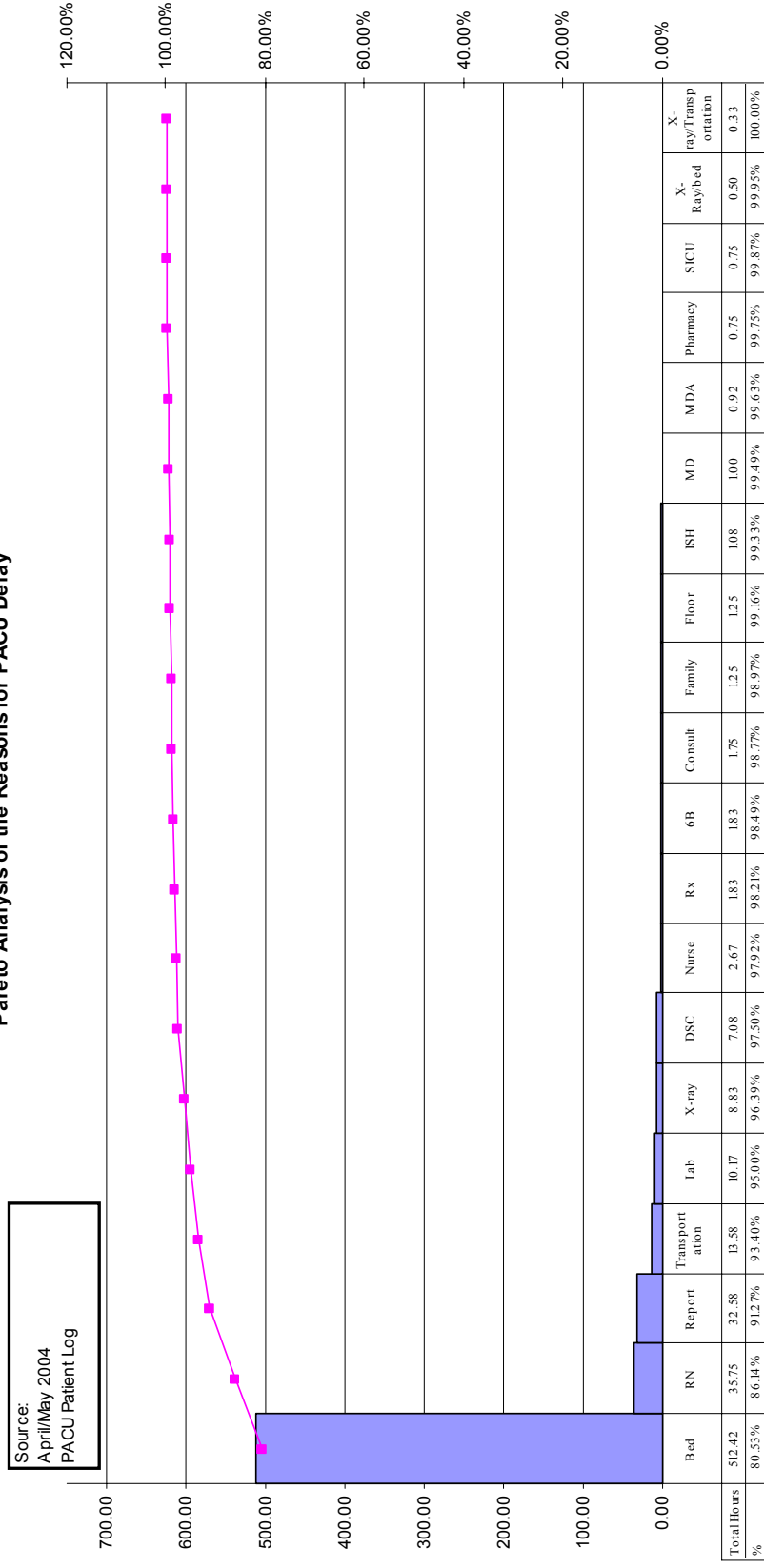
Source:
April/May 2004
PACU Patient Log

Delays by Day of Week for PACU



Pareto Analysis

Pareto Analysis of the Reasons for PACU Delay



Words from the experts...

- “Often the most effective way to describe, explore, and summarize a set of numbers –even a very large set of numbers – is to look at pictures of those numbers”

Edward R. Tufte (1983) *The Visual Display of Quantitative Information*

“ ... a man who has carefully investigated a printed table, finds, when done, that he has only a very faint and partial idea of what he has read; and that like a figure imprinted on sand, is soon totally erased and defaced.”

William Playfair (1786) *The Commercial and Political Atlas*, from Edward R. Tufte (1983) *The Visual Display of Quantitative Information*.

Good Graphical Methods Should:

- Show the data
- Point the viewer to the substance and not
 - The methodology
 - The graphic design
 - The technology of the analysis or graphic
- Avoid distortion of what the data have to say

Good Graphical Methods Should:

- Present many numbers in a small space
- Make large data sets coherent
- Encourage comparison
- Reveal the data at several levels of detail
- Serve a reasonably clear purpose:
 - Description, exploration, tabulation, and decoration
- Be related with the statistical and verbal description of the data set

Excellent Graphical Presentation

- Is the well designed presentation a matter of
 - Substance, statistics, and design
- Does the presentation consist of complex ideas communicated with
 - Clarity, precision, and efficiency

Excellent Graphical Presentation

- Will give the viewer the greatest number of ideas quickly with the least ink in the smallest space
- Is usually multivariate
- Requires telling the truth about data

Graphical Integrity

- Tables are typically effective for small data sets
- Representation of numbers should be directly proportional to the numerical quantities being represented.
- Clear, detailed, and thorough labeling should be used.

Common Terms

- Baseline: data at the beginning of the improvement initiative.
- Goal/target: numerical performance for end of the improvement cycle. This may change every 6 months (if so, commonly called a target).

Common Terms

- Benchmark- numerical performed that is the best found and recognized as that in the literature.
- Best practice- best numerical performance you can find.

Rules for understandable graphs

- To avoid distortion of data, make sure the scales are the same when comparing data or using multiple graphs.
- Use clear detailed labeling. Write out explanations of the data on the graph.
- Use an arrow which indicates the desired direction of the improvement near the Y (value) axis.

Summary

- Follow PDCA model.
- Take your time determining your data collection plan.
- Trial or pilot your data collection plan to ensure understanding of data definitions.
- Display data graphically when possible.
- Include baseline data in display. Include goal or target also.