

# IMPROVING SURGICAL SERVICES THROUGH ENHANCED ANCILLARY SUPPORT

Jace Manning  
 Management Engineer  
 Intermountain Healthcare  
 Utah Valley Regional Medical Center  
 1034 North 500 West  
 Provo, Utah 84604  
 E-mail: Jace.Manning@imail.org  
 Phone: (801) 357-8141

## ABSTRACT

This paper focuses on the results of two concurrent initiatives within the Central Processing (CP) department at Utah Valley Regional Medical Center. The first was aimed at reducing errors and improving the quality of service provided by Central Processing. The second examined the efficacy of the workload measurement system used to determine appropriate resource utilization.

## 1 INTRODUCTION

The operations of Central Processing are considerably standard when compared against those in other areas of a hospital. The primary function of the department is to decontaminate, assemble, wrap and sterilize instrument sets for use in surgical cases. In addition to this, CP personnel also assemble case carts based on surgeon requirements. These carts consist of the necessary instrumentation and disposable items needed to successfully complete the surgical case.

Though the core concept of Central Processing functionality may be straight forward, it is fairly difficult to ensure that errors will not be made. Typically, the department faces a number of obstacles including fluctuation in daily case volumes, variation in case size/complexity, delicate specialty instrumentation that can be easily damaged, and an extremely large number of individual instruments being sterilized on an annual basis.

## 2 ERROR REDUCTION / KAIZEN TEAM

The primary driver behind the Central Processing overhaul was a perceived lack of quality being delivered to the surgical departments. The consistently high observed error rate was leading to case delays which were impacting OR utilization and creating surgeon dissatisfaction. Even more concerning was the potential impact on patient safety. The first step taken to combat the issue was to form an interdepartmental task force that would be used to bolster communication and enhance service standards. This group, formally referred to as the Kaizen Team, consisted of the following members: Regional Administrative Surgical Services Director, Surgical Services Medical Director, OR Manager, CP Manager, Outpa-

tient Center SDS Manager, management engineer, OR nurses (3), CP techs (3), and center core tech.

With the group in place, it was vital to quantify the magnitude of the issue; however, the existing error reporting methodology was insufficient for gathering the data needed to solve the problem. Management Engineering, with assistance from OR and CP staff, developed a new system for reporting errors that eliminated subjectivity and allowed for enhanced data stratification. The new worksheet included areas to indicate case type, error type, as well as case impact and response time. It was designed to be filled out quickly, using check marks rather than the narrative format that was employed in the previous reporting methodology. The revised worksheet can be seen in Figure 2.1.

**Figure 2.1: Improved Error Report Worksheet**

**Central Processing Self-Coding Error Report Sheet**

Date: _____	<b>Case Type</b>
Time: _____	<input type="checkbox"/> Cardio
Reported By: _____	<input type="checkbox"/> Cysto
Room: _____	<input type="checkbox"/> ENT
	<input type="checkbox"/> Eye
	<input type="checkbox"/> General
	<input type="checkbox"/> Gyn
	<input type="checkbox"/> Neuro
	<input type="checkbox"/> Ortho
	<input type="checkbox"/> Plastic

Pt. StickerName:

**Case Cart Error Description (Check Most Appropriate)**  
*Please attach copy of DPC*

Incorrect Pack

Wrong Supply

Liquids Missing

Incorrect Item Quantity

Missing Instrument Set

Incorrect Instrument Set

Missing Item Marked on DPC

Missing Item Not Highlighted on DPC

Damaged Pack or Product

Other Describe: \_\_\_\_\_

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**Instrument Error Description (Check Most Appropriate)**  
*Please attach label from pan or package*

Incorrectly Labeled Pan or Instrument

Instrument(s) Missing

Dirty Item in Set

Missing Chemical Indicator

Incorrectly Assembled Instrument

Incorrect Instrument(s) in Set

Damaged Instrument(s) in Set

Loose Filter Plate

Other Describe: \_\_\_\_\_

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*Please Circle Y or N*

Did the error delay the case?      **Y**      **N**

Was the surgeon aware of the issue?      **Y**      **N**      Name of Surgeon: \_\_\_\_\_

Was the error critical?      **Y**      **N**

**CP Response Time (Check Most Accurate)**

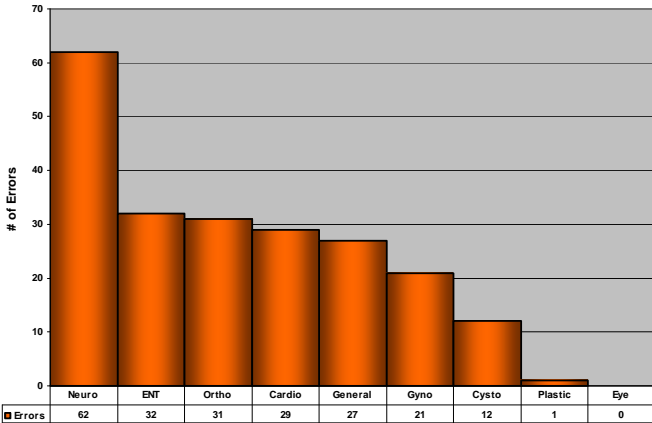
Under 5 min.       5 - 10 min.       10 - 15 min.       Over 15 min.

\*A case cart and/or instrumentation error can be defined as critical when:  
 a) It directly impacts the surgical outcome.  
 b) Patient safety has been seriously jeopardized.  
 c) Instrumentation and/or equipment vital to the completion of the surgical case is missing, contaminated, or in disrepair.

The revised reporting tool was utilized for a number of weeks in order to ensure data integrity as well as give Management Engineering time to adequately gauge trends. As can be seen in Figures 2.2 through 2.5, a number of charts were developed to understand possible areas of improvement within Central Processing.

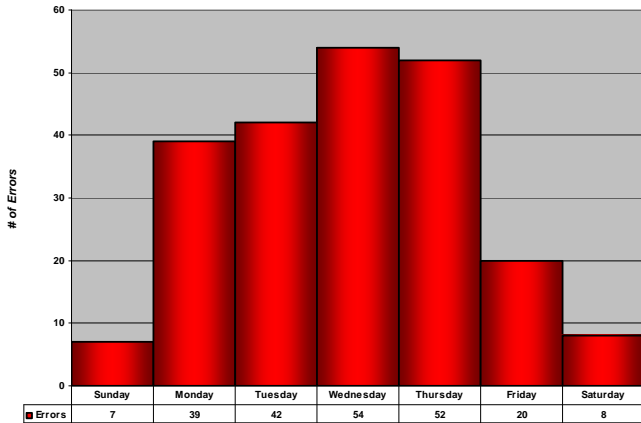
**Figure 2.2: Case Type Error Chart**

**Cumulative Errors by Case Type**



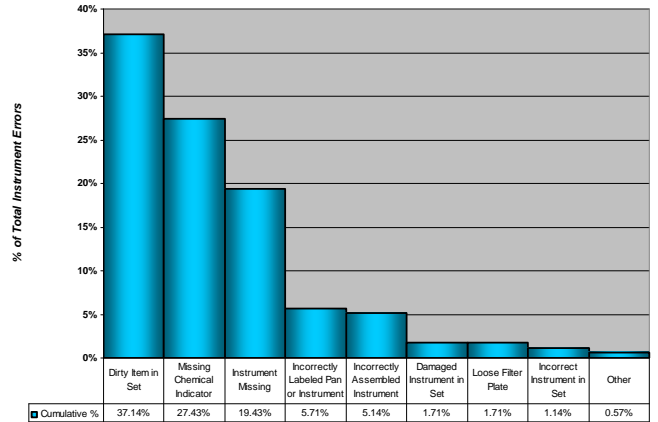
**Figure 2.3: Day of Week Error Chart**

**Cumulative Errors by Day of Week**



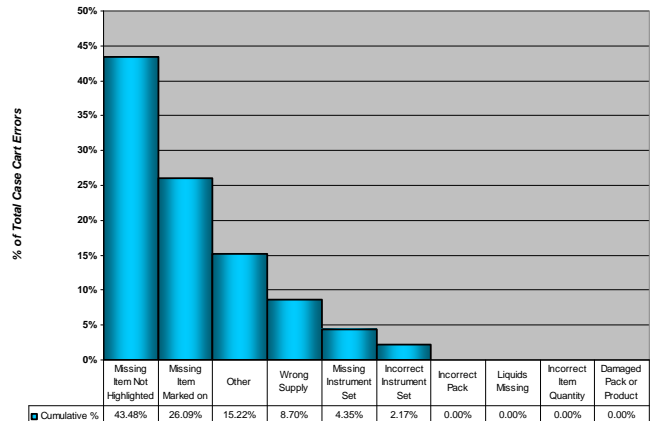
**Figure 2.4: Instrument Error Distribution Chart**

**Cumulative Instrument Error Distribution**



**Figure 2.5: Case Cart Error Distribution Chart**

**Cumulative Case Cart Error Distribution**



The information outlined in the previous charts was presented to the Kaizen Team, and what followed was a brainstorming session to determine root causes and generate potential solutions. Separate Ishikawa diagrams were constructed for instrument set errors (Figure 2.6) and case cart errors (Figure 2.7), and the team set forth in identifying action items that would have immediate operational impact.

This exercise allowed the Kaizen Team to recognize numerous areas of opportunity and enact improvements including (but not limited to) the following:

- updating and standardizing surgeon preference lists,
- tying set information in the instrument tracking system to ORMIS, the system used to build case pick lists,
- streamlining the CP process through work standardization and improved communication,
- reorganizing the Center Core area to include frequently used items that once resided in CP,

- purchasing additional case carts to alleviate shortages,
- purchasing small tool sets to do minor repair work at assembly stations,
- placing visual identifiers on “rush” and “stat” items to assure rapid turnaround,
- providing customized training for employees based on actual errors made,
- holding regular staff in-services on how to check each instrument for cleanliness.

*Figure 2.6: Instrument Set Ishikawa Diagram*

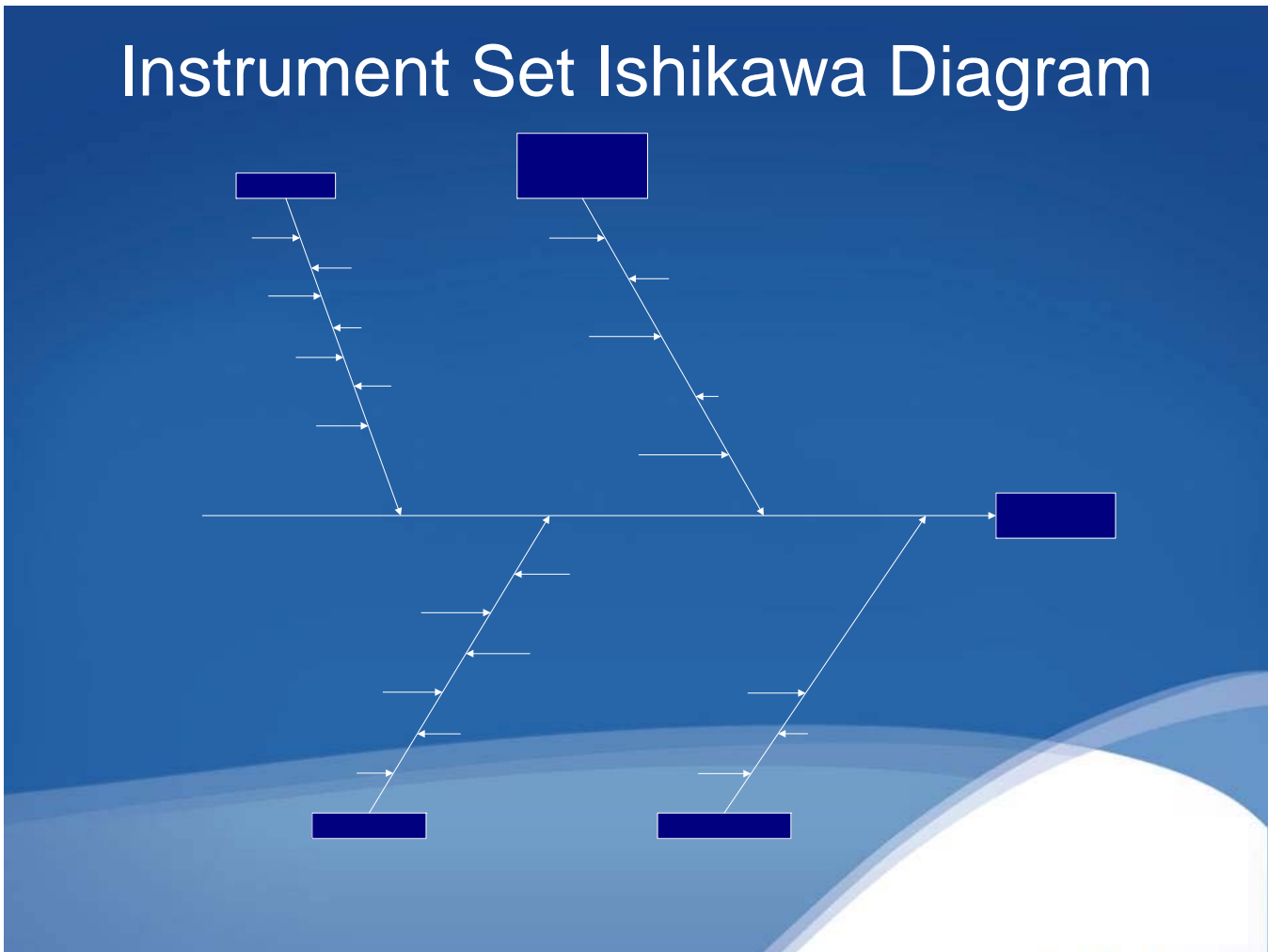
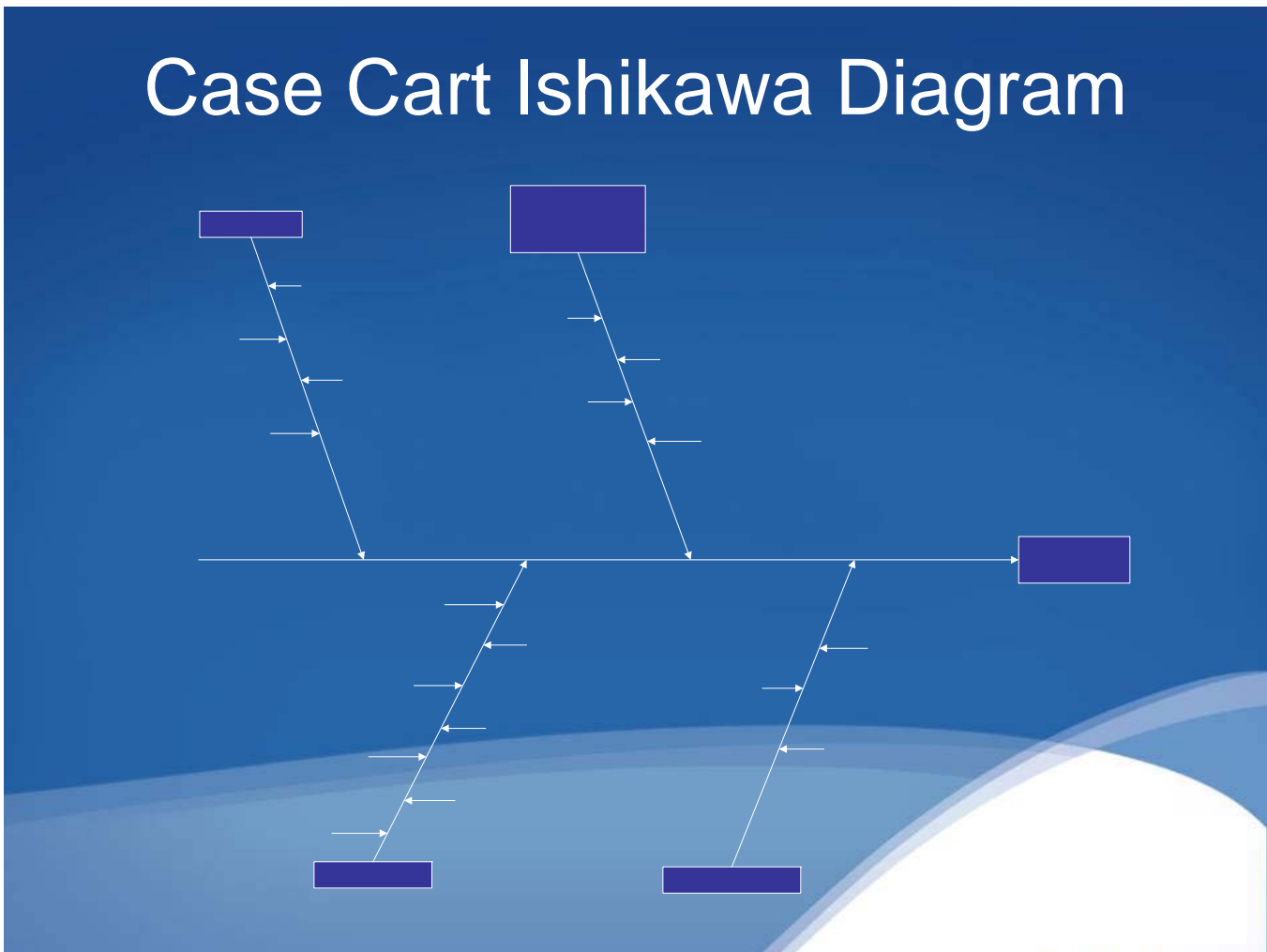


Figure 2.7: Case Cart Ishikawa Diagram



### 3 WORKLOAD MEASUREMENT ANALYSIS

In conjunction with the error reduction initiative was a project to analyze the efficacy of the workload measurement system that had been in place in CP for nearly two decades. The system in question is used to determine appropriate resource utilization based on workload volumes and weighted unit standards called Relative Value Units (RVU) for various activities. In the case of CP, workload generation was tied specifically to metrics that were largely out of the department's control, namely OR minutes, ER registrations, labor and delivery cases, and cath lab procedures.

The issue with these indicators was that they did not accurately account for a variety of tasks being completed by CP personnel. To prove this, Management Engineering collected data from the barcode-based instrument tracking system that

CP installed in 2004. What follows is a summary of the data analysis.

- OR minutes accounted for 75% of RVU accrual; however, sterilization records showed that OR cases actually accounted for approximately 94% of actual CP workload.
- ER registrations accounted for 3% of RVU accrual; however, sterilization records showed that ER pans accounted for only 1.5% of total pans sterilized.
- Cath lab procedures accounted for 4% of RVU accrual; however, case cart scans indicate that these procedures only accounted for 2.6% of total case cart assemblies.
- Labor and delivery cases accounted for 18% of RVU generation; however, if CP had provided instrument sets for every case, it still would have only accounted for approximately 2% of total sterilized sets.

It was evident that the existing system of workload measurement was flawed, and because the instrument tracking system used in the initial data analysis had a productivity monitoring feature, it was determined that it could potentially be a suitable replacement. The system uses unique barcodes for individual tasks and associates a time value that is credited to an employee whenever it is scanned. The same is true for the individual instrument sets, although prior to this initiative, the data were primarily used to gauge the location of a given instrument set rather than the associated workload.

In order to properly test the efficacy of the instrument tracking system as a workload measurement system, Management Engineering and CP had to perform a rigorous overhaul of the productivity system in order to update time standards and add new tasks. A seven month data validation phase was then used to determine if, in fact, the system would provide a sufficient alternative to the existing system. The study showed the system to be 98.1% accurate when compared to the actual productive hours utilized by CP during those months, and as such, was approved to replace the existing workload measurement system effective January 2008.

**Figure 3.1: Data Validation Spreadsheet**

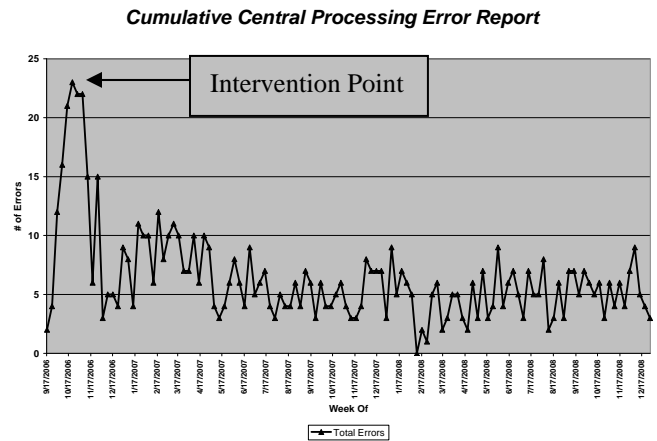
	Value	Value	Value	Value	Value	Value	Value
	MTD	MTD	MTD	MTD	MTD	MTD	MTD
	Actual	2007	2007	2007	2007	2007	2007
	June	July	August	September	October	November	December
	Control Proc. 144	Control Proc. 144	Control Proc. 144	Control Proc. 144	Control Proc. 144	Control Proc. 144	Control Proc. 144
40036	144.0	128.0	184.0	144.0	176.0	120.0	128.0
40046	-	-	-	-	-	-	-
40056	-	-	-	-	-	-	-
40064	-	-	-	-	-	-	-
40074	1,263.8	1,286.5	1,346.5	1,152.0	1,443.8	1,321.0	1,254.5
40096	-	-	-	-	-	-	-
40126	-	-	-	-	-	-	-
40146	-	-	110.0	97.5	193.3	173.3	158.8
40156	-	-	-	-	-	-	-
40164	2,896.8	2,980.8	3,269.8	2,912.8	3,201.3	3,045.0	2,729.8
40234	-	-	-	-	-	-	-
40244	532.0	512.5	577.8	487.5	596.3	589.0	542.0
40274	-	-	-	-	-	-	-
40296	-	-	-	-	-	-	-
PR925	4,956.5	4,896.8	5,491.8	4,793.8	5,496.5	5,248.3	4,896.3
-	4,812.5	4,746.8	5,367.0	4,648.8	5,433.3	5,126.3	4,876.3
<b>Microsystems Data</b>							
Total Hours Worked	4,837.3	4,242.0	4,405.6	4,239.0	5,204.0	4,905.5	4,567.1
Hours Accomplished	4,343.8	4,562.6	4,918.3	4,462.9	5,402.5	5,267.8	5,137.0
Ancsu Pans & Filters Carry Over	492	355	251	412	244	363	475
Individual Instrument Carry Over	55	14	27	60	39	24	55
Blue Drawer Carry Over	141	57	53	89	58	61	76
Small Case Cart Carry Over	32	24	21	11	19	15	46
Medium Case Cart Carry Over	66	25	31	42	45	41	82
Large Case Cart Carry Over	20	10	11	14	13	19	42
Equipment Carry Over	538	201	184	272	186	327	533
Incomplete Case Carts	210	148	148	88	258	138	74
Total Carry Over Time	100.5	47.0	43.4	64.0	51.4	58.1	103.4
Hours Worked Accuracy	88.91%	88.89%	83.01%	91.17%	86.78%	86.86%	87.82%
Hours Accomplished Accuracy	90.28%	98.86%	92.84%	95.98%	99.42%	103.11%	109.81%

**4 RESULTS**

The efforts of the Kaizen Team were certainly successful in mitigating the number of errors committed by Central Processing. The error rate was reduced from 6.24% prior to implementation to 1.75% overall for 2008. This error rate is inclusive of both instrument errors and case cart errors and is compared against the total number of surgical cases. It should be noted that the bulk of these were instrument errors; of the 256 reported errors in 2008, 205 of them were individual instrument errors. When that figure is measured against total instrument sets sterilized (over 200,000) and total individual instruments sterilized (over 3,000,000), the numbers look much better; however, the ultimate goal is still a zero defect

environment. The figure below outlines the trend in errors from the beginning of the initiative through the end of 2008.

**Figure 4.1: Cumulative Error Report Chart**



The workload measurement overhaul also had significant positive effects in CP. Because of the ability to accurately determine needed resources based on actual workload, the department was able to operate more efficiently and cost-effectively. Below are year to date comparisons of various quality indicators from 2007 to 2008.

**Figure 4.2: Final Result Table**

	2007	2008
<b>RVU/Productive Hour</b>	57.25	58.06
<b>Productive FTE Variance</b>	-0.32	+1.46
<b>Productive Salary Variance</b>	-\$61,572	+\$90,986

**5 SUMMARY**

These two separate, yet highly successful initiatives were driven by an urgent need for improvement. The data-driven methodology of both projects proved to be the engine that propelled Central Processing toward achieving greater levels of customer service. It should also be noted that the multidisciplinary approach used in forming the Kaizen Team was key in providing the broad range of perspectives necessary when dealing with interdepartmental issues.

In summary, a host of traditional data analysis tools were utilized, which aided Management Engineering as it:

- created a cross-functional Kaizen Team to implement rapid change,
- improved the existing error reporting methodology to promote data driven management,
- employed brainstorming and root cause analysis techniques to generate effective solutions, and
- creatively utilized existing technology to accurately determine appropriate resource utilization within CP.