INSTRUMENT PROCESSING
ORGANIZATIONAL ANALYSIS

Final Report

The University of Michigan Hospitals
Main Operating Room

Management Systems Department
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The Instrument Processors

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EXECUTIVE SUMMARY

As technology advances, hospital instrumentation has become increasingly specialized. The training necessary for instrument processors has increased accordingly. In order to keep up to par on new technology, the learning process of instrument processors should be directly proportional to this factor. Within a highly fluctuating environment, it is difficult for one to measure such factors as workload, since there is no standard performance present to compare with other measures.

The current situation in the instrument processing room encompasses many interacting factors related to training, workload, and productivity. The large amount of workload due to the increase in cases of the Main OR necessitates an increase in instrument processors to maintain a steady process flow. Yet, the fixed budget allocation for employees reduces the manipulation of this staffing factor. This is the reason for the increase in temporaries in order to keep the flow of the process moving efficiently. Another factor arises when dealing with the lack of experience and skill of the temporaries.

In order to optimize operating efficiency, the project was approached from an organizational analysis perspective. This entailed: review of the instrument processors' position descriptions, observations of the instrument processors, analyses of OR statistics in relevance to the instrument processing function, and development of a worker survey. Review of the instrument processors' position descriptions were used to assess the current situation. Observations were made of the instrument processors and the nursing staff to correlate with the statistical data provided. A survey was developed and conducted to enhance comments made and observations recorded from the instrument processors.

Out of four recommendations given, the first two pertained more towards productivity and standardizing skill and knowledge level. These were, implementation of a standard training program for all employees and a monthly control chart. The responsibility of implementation, testing, and evaluating new methods would lie on the OR trainer/coordinator. In order to monitor and improve productivity in the instrument processing room, accurate data must be provided. This can be achieved through the use of a control chart.
The control chart will allow management to key in on systematic problems by looking at the outliers the control limits and the variance. The final recommendation was to conduct monthly meetings to discuss progress with training, control chart, new technologies, policies, etc. The last two recommendations were made to address two critical issues of training and workload. The first was to hire an OR training coordinator with extensive experience in instrument processing to provide on the job training for the processors. The second recommendation involved implementing two levels of instrument processors. Instrument processors would hire in as Level I, and move to a Level II after passing a standard test and having a certain number of years experience.

Implementation of the training program developed and utilization of the proposed control chart will assist in the goal to increase operating efficiency in the instrument processing room as well as the OR itself.
INTRODUCTION

Purpose

The primary objective of this project was to assist the University of Michigan Hospitals Operating Room in achieving an increase in operating efficiency as part of its Total Quality Management Process. Specifically, this project examined increasing Operating Room efficiency through an organizational analysis of the instrument processing function relative to its environment. Critical elements such as: scope of job function, training requirements, staffing levels, and staff scheduling were examined for the instrument processors. This final report provides a comprehensive analysis of the factors considered, as well as implementation recommendations to improve the collective efficiency of the instrument processing function.

Background

As technology advances, hospital instrumentation has become increasingly specialized. The training necessary for instrument processors has increased accordingly. Under its current operating structure, the Instrument Processing Department is required to hire temporary staff to meet its schedule. Typically, this staff has relatively little knowledge with respect to this field. As a result, processing time and error rates are suboptimal. Additionally, the new Main OR has more than twice the operating room capacity of the old Main OR, however the number of instrument processing personnel has decreased. Furthermore, a constraint under which the instrument processors are currently operating is the size of the processing room. This room was originally designed for processing only specialty instruments, yet is currently used for processing all OR instruments.
APPROACH & METHODOLOGY

An organizational analysis of the Instrument Processing Department was conducted. The motivation for recommending an organizational analysis for the Instrument Processing function was derived from the potential advantages offered by this methodology for optimizing operating efficiency. In particular, the objective of this organizational analysis was to provide suggestions regarding the design and structure of individual instrument processing positions and relationships among these positions to better enable the instrument processing function to accomplish its objectives effectively and efficiently.

The organizational analysis encompassed a review of the instrument processors' position descriptions, analysis of a detailed survey developed specifically for and distributed to the instrument processors, and examination of OR statistics relevant to the instrument processing function. Possible revisions to the functions performed by the OR Assistants were also considered. The scope of the analysis focused on the instrument processors' productivity and job functions, with observations regarding the nursing staff utilized as pertaining to the instrument processing room.

The organizational analysis conducted was supported through the use of several performance monitoring criteria. Statistics reported by the Operating Room and observations regarding the workload and productivity of instrument processors served as performance measurement indicators. The survey developed for the instrument processors provided employee feedback on the issues of training, workload, and productivity. In addition, the quality and service level currently being provided by instrument processors were examined from a Total Quality Management perspective. Factors affecting performance were identified and recommendations were formulated.
CURRENT SITUATION

Several factors limiting the productivity and efficiency of the employees do exist. Some of these factors are beyond the scope of this project, but have affected our approach. The the size of the instrument processing room was one such constraint. The room was originally designed to accommodate only specialty instruments, and was not intended to service the entire OR caseload, as is currently the situation. Secondly, due to union constraints, hiring qualified personnel is often difficult. Thirdly, due to the budget allocation, simply proposing the hiring of additional employees was not justifiable. However, due to the increase in OR caseload, four temporaries were hired. These employees are only permitted to work for 89 consecutive days, and then they must leave their position for at least 30 days before returning. The salary for these employees comes from a separate section of the budget, and does not conflict with the actual budget allocation for the instrument processors.

After assessing the present situation with all concerned parties, several factors were identified as the focus of our study. Specifically, the primary areas investigated were: training, workload, and productivity. In order to obtain a more accurate reflection of the current situation, we developed a survey that explored these three areas in depth. There was a 100% response rate. The survey is discussed at length in the Results Section.

The instrument processing room in the UMH poses a unique situation. First, since the hospital is a research and teaching hospital, a majority of operations performed are extremely specialized and complex. Secondly, due to the size of the hospital/OR facility, the caseload is rather impressive. These factors greatly affect the workload of the instrument processors. Obtaining quantitative measurements of workload and productivity was difficult, because no formalized method for tracking the number of trays completed in a day currently exists. In addition, the exact number of trays and wraps required for each case is typically not documented. Estimating these figures is difficult, because the figures vary not only by case, but also by the particular doctor performing the surgery.

Significant variance in the quantity and type of training received by the instrument processors exists. As indicated above, due to the fact
that the temporaries may only be employed for brief periods, their training is typically sporadic. The lack of availability of a formalized training program has predicated that the majority of technical training provided to the instrument processors is “hands-on” training as required. In addition, the return on the hospital’s investment for training temporary employees is not clearly evident. Based on the results of a survey developed for the instrument processors, a definite desire exists on the part of the instrument processors to be better informed and to receive more comprehensive training regarding their position in relation to the OR as an organizational entity.
RESULTS

Relevant Data

There was a significant amount of quantitative data relating to the OR, but little data on the instrument processing function itself. Therefore, OR statistics were examined as pertaining to instrument processing. These statistics provided an overview of the instrument processing function. Some of the relevant information collected specifically on instrument processing includes:

Employee Related Data:
1. Names and experience (in years) of instrument processing personnel
2. Current job descriptions
3. Employee proposed job reclassification descriptions
4. Specific duties and areas of specialization among the employees
5. Evaluation, promotion, and orientation forms

Instrument Data:
6. Number and type of instruments required for every main type of operation.
7. Number of instruments and trays sent to CSS to be steamed and gased (For periods of Sept. 18, 1990 through Oct. 31, 1990)
8. Listing of main instruments and their characteristics

Overall Statistics for the OR:
9. Cases per month by service (July-Sept., 1990)
10. Cases per year (for the fiscal year ending June 1990)
11. Total volume per year
12. Typical daily OR schedule
13. Percent utilization by core per day for Aug. 1988

This data was organized and evaluated in a manner such that the relevant information could easily be extrapolated. In order to maximize the meaningfulness of the data, the consultant team correlated the previous information with individual observations. The majority of the observations were qualitative. Several hours were spent directly observing the instrument processors at various shifts. This was done both on an individual and team basis.
addition, each consultant toured the OR and Central Sterilization Supply (CSS).

Observations were supported through the use of a survey. The consultant team developed the survey, to be completed by all of the instrument processors, to address specific issues of concern. The survey was divided into three sections corresponding to training, workload, and productivity. The survey results provided the team members with additional insight into those three areas. General comments and input provided by the processors were also incorporated into our analysis. In the following sections, the results of the survey and its impact will be discussed. The instrument processors' input and cooperation was extremely beneficial.

Survey Results

The surveys were distributed, completed, and collected during November 14 - 16. Analysis and compilation of survey results ensued immediately thereafter. As previously mentioned, the surveys focused on three areas: training, workload, and productivity. Some of the variance observed in these areas was due to the large difference in experience (3 weeks - 17.5 years) and the difference in shift worked (days, afternoons, nights). The majority of people worked on day shift (7). There was also a noticeable difference in employee experience between day and afternoon shifts. (Only one person works the night shift.) The day workers had an average of 6.4 years of experience while the afternoon shift had an average of only 1.4 years of experience. The afternoon shift included most of the temporary workers. Thus, there probably is a large difference in training, workload, and productivity between these two shifts. These three areas are discussed extensively in the following sections.

Training

The figures below indicate the types of instruction received. The numbers reflect the number of instrument processors in which the answer given applies. Multiple answers were permitted for this section of the survey.
• Books, reference sheets, instructional aids 11
• Hands-on training, personal help 10
• Video 5
• Classroom instruction 1
• Former supervisor 1

The provider of the hands-on training for the processors is shown below.

• Fellow worker 11
• Supervisor 6
• OR technician 2
• No one (studied on own time) 1

The training provided for OR instrument processors varied considerably from individual to individual. Five of the workers had received no formal training, four had received three weeks or less, and three had received two months. From the additional comments provided, only two employees suggested that they had received adequate training. Of course, the temporary employees had been provided with the least training due to the restriction on their work period. Several workers expressed a need for increased availability of visual aids (i.e. books with pictures) and for a formal training program. There were also several requests for additional one-on-one training.

Workload

The number of times an instrument processor works into his/her lunch hour is shown below.

• Frequently 6
• Sometimes 3
• Rarely 1
• Never 2

The processors who worked during the day shift reported that their busiest periods were mid-morning to early afternoon (10am-3pm), and the least busy periods were generally early in the morning (7am-9am). For the afternoon shift, the busiest times were early evening (5pm-10pm), and the least busy times were early afternoon (3pm-5pm).
The instrument processors appear to be extremely busy during their shift. As reflected in the survey results, a majority of the workers often work into their lunch period. In addition, one worker reported taking no breaks on average during the day, while 6 employees said they took one break on average, and five employees took two breaks. The standard break allotment is two per day at 15 minutes each. Although the workload is admittedly intense at times, many of the instrument processors seem to "enjoy the challenge," as long as they are able to "stay with it," as one worker expressed the sentiment. Another employee also commented that the workload fluctuates significantly. These assessments correspond to the actual caseload variance in the OR. Furthermore, caseload has increased significantly over the past few years, particularly when operations moved from the old Main OR to the current UMH Main OR.

Productivity

The frequency with which a nurse, doctor, OR technician, etc. comes directly into the instrument processing room and requests a specific instrument is shown below.

- Frequently 11
- Sometimes 1
- Rarely 0
- Never 0

The percentage of trays with missing items.

- 75-100% 2
- 50-74% 6
- 25-49% 0
- 0-24% 4

As indicated above, the instrument processors encounter missing instruments and interruptions in their work on a regular basis. These interruptions limit the time employees have to complete trays, thereby reducing productivity. Another factor constraining employee productivity is the time spent outside the OR, either tracking down instruments, or going to/from CSS and Mott. The percentages for these occurrences ranged from under 25% for seven of the employees, up to 50% for 5 of the employees. Some of the comments received regarding productivity involved factors beyond our control, such as a larger working area and additional instruments
with which to work. A few individuals expressed concern regarding the importance of teamwork and quality work in enhancing productivity. One employee suggested weekly in-service meetings to keep the instrument processors abreast of advanced procedures and new instruments.

The results of this survey were directed the management team to focus on four areas for further consideration. These areas include issues relating to: staff scheduling and functions, a control chart to improve the productivity of the instrument processing function, a training program, and monthly group conferences.
CONCLUSIONS

Staff Scheduling and Functions

Although one solution to decreasing the workload in the instrument processing room might suggest the hiring of additional employees, this solution does not address the issue of optimizing productivity. In addition, the feasibility of such a suggestion is constrained by factors such as the current budget and physical size of the room. Therefore, the consultant team has formulated a more creative solution to improve the efficiency of the instrument processing function. Two staffing related recommendations will be made to achieve this goal. The first recommendation involves hiring an OR technician to function as a trainer and team leader for the instrument processors. The second recommendation provides for two levels of instrument processors (I & II).

Training new instrument processors has been a difficult task for supervisors, because the scope of their responsibilities often places them outside of the OR. Due to continuously changing technology, instrument processors are required to learn new instruments and trays on a regular basis. Thus, the burden of training inevitably becomes the responsibility of the more experienced instrument processors. When the veteran instrument processor assists the inexperienced employee, not only is the inexperienced employee processing trays at a slow rate, since he or she is still learning, but the veteran employee loses valuable time for processing trays. Hiring an OR/surgical technician as a trainer could provide a feasible solution to the training issue. To be certified, the technician is required to have completed a minimum of 2 years college or technical school training coupled with several years experience in instrument processing. According to The American Almanac of Jobs and Salaries (87-88 edition)\(^1\), the average wage for a surgical technician in the Detroit area was approximately $8.44/hour. This is only slightly higher than the pay rate for the instrument processors themselves (currently at $8.16/hour).

Although this position is not included in the current budget, by phasing out the current temporaries, the budget could be reallocated to this position. Since training would not be done on a continuous basis once all instrument processors had been adequately trained, the OR training coordinator could then assist the instrument
processors in processing specialized trays and wraps. He or she would work from 8am-5pm or 9am-6pm in order to be of assistance to the day shift and the afternoon shift. The OR trainer's job would also include keeping up to date on current technology and then forwarding the knowledge to other instrument processors.

For the instrument processors themselves, two different levels could be used to distinguish the experience and expertise of the instrument processors. Incoming processors would be automatically assigned to the Level I processor position. Before reaching the next level, processors would be required to have a certain number of years experience, then pass a standard test implemented and given by the OR trainer. At Level II, the instrument processors would be given increased responsibility for the instruments, be assigned to certain specialities within the OR, and provide the OR trainer with recommendations for training program improvements.

Control Chart

A control chart is a chart consisting of one or more solid centerlines and one or more dashed control limits, which is used to evaluate the state of control of a process. The chart represents a series of observations obtained from a given process, such that the observations are not identical to each other. Knowing that groups of measurements from a constant system of causes tend to be predictable, one can utilize a control chart by setting limits of fluctuation and observing the patterns which come about from the plotted points on the chart.

The control chart to be used from this project will record the number of trays processed per day by all three shifts and will represent certain upper and lower limits relating to productivity of the instrument processing team (see example in Figure 1 of the Appendix). The variables used are similar to those of a statistical p-chart, yet a proportion of defective units will not be used which is the general definition of p according to quality control engineers.

Chart Objectives:

1) To improve quality

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2) To shrink the control limits in order to reduce the variance
3) To make the process more stable
4) To find the cause of some difficulty which is currently being experienced
5) To discover which operations or characteristics are capable of changing or influencing other operations.
6) To improve the entire system and increase the average number of units processed (to move the centerline up).

Variables:

\[ n = \text{no. samples in a series} \]
\[ p = \text{no. of units in a sample} \]
\[ p_{\text{ave}} = \text{average number of units in all samples of the series} \]

\[ p_{\text{ave}} = \frac{p}{n} \]

Upper Control Limit = \( p_{\text{ave}} + 3\sqrt{\frac{(p-p_{\text{ave}})^2}{n}} \)

Lower Control Limit = \( p_{\text{ave}} - 3\sqrt{\frac{(p-p_{\text{ave}})^2}{n}} \)

Instructions:

1) Total the number of trays processed from the slash marks on tally sheet (see example in Figure 2 of the Appendix) at the end of the 24-hour cycle period.

2) Make an “X” on the control chart with a pen at the point in accordance with the day and the number of trays.

3) Total the number of wraps processed from the slash marks on the tally sheet, at the end of the 24-hour cycle period.

4) Write this total in the space provided on the chart for wraps in accordance with the day they were processed.

5) At the end of one complete month of recordings, find the average number of trays processed by taking the sum of all 20 daily totals and divide by 20. Draw a straight line across
6) Draw the control limits (dashed lines) across the control chart. The formula for these limits is not necessarily needed to create the lines. A simple observation of all the points above and below the average (centerline) will be sufficient to establish the limits at equal distances from that average.

7) When an outlier (any point outside the dashed control limit lines) is seen on the chart, immediate recording of any possible causes should be performed. Also, the manager or supervisor should be making periodic observations of the control chart.

Tests could be performed for unnatural patterns in order to determine the instability of the system of causes, yet this chart is very simple in statistical terms. Therefore, the instabilities or point outliers can be identified easily by observations of the chart. In order to optimize the potential benefits of the control chart, certain training program aspects should be utilized.

Training

The mission of the Operating Rooms is to provide quality physical, emotional, and psychological support for patients undergoing surgery or having a diagnostic procedure. The OR team functions as an interdisciplinary team; each member contributing their knowledge and expertise in accomplishing the mission of the OR (adapted from the OR Mission Statement). Instrument processors directly affect the quality of patient care provided within the OR. The more knowledgeable an instrument processor is regarding his or her role and function relative to the rest of the organization, and the more current his information in technological advances and resources, the more efficient and effective the instrument processor will be in his position. Formal training programs afford numerous benefits that increase staff productivity and efficiency. In particular, management's demonstration of commitment to staff development through the use of training programs will minimize staff turnover, increase staff loyalty, and improve employee morale.

Several options regarding potential, formal training programs were investigated. However, the availability of such training programs in
the health care industry are rather limited and expensive. Thus, our consultant team has developed a training program tailored to the instrument processing function, which if effectively implemented may positively affect instrument processor productivity.

Training program development proceeded as outlined in Figure 1. Initially, an assessment of training needs was performed. As mentioned previously, the instrument processing survey established both the necessity and desire on behalf of the instrument processors for a training program. After careful consideration of these training needs, and a comprehensive review of current literature in the field of designing hospital training programs, a proposal for suggested course content was designed. The consultant team considered training program with independent modules to be of critical significance. The modular training system is fundamentally a series of training program concepts capable of being individually implemented with success. Listed below are four essential training modules and their potential content:

Critical Instrument Processing Training Modules & Their Content

I Interdepartmental Relationships
   A. Tour Instrument Processing Room
   B. Visit Cores
   C. Tour Central Sterilization & Supplies

II Basic Bacteriology
   A. Necessity for sterilizing equipment
   B. Transmission of airborne bacteria
   C. Types of sterilization methods
   D. Importance of through cleansing of items
   E. General housekeeping

III Equipment Demonstrations
   A. Autoclave
   B. Ultra-sonic washer
   C. Endoscopic equipment

IV Instrument Demonstrations
   A. Instrument documentation
   B. Proper tray procedure
   C. Proper wrap procedure
Figure 1: Outline of Training Program Development

1. Needs Assessment
2. Define Course Objectives
3. Course Content
4. Implementation Media
5. Program Evaluation
Training program objectives may be achieved through a variety of implementation media. A lesson plan should be drafted (see Sample Lesson Plan Outline in the Appendix), and supporting implementation media should be selected. As Grubb and Mueller\(^2\) suggest, instructional materials enrich the student's learning experiences and when used appropriately, assist in focusing the attention of the student on crucial aspects of the program. Written instructional materials include: textbooks, workbooks, handouts, outlines, written procedures. Specific types of audiovisual instructional media include: videos, movies, and pictures. Use of visual media to supplement equipment and instrument demonstrations is highly recommended. Current sources of training materials are Zimmer, Calgon, and V. Mueller. One potential resource warranting investigation is Davis & Geck, which provide two VHS tapes "In-House Sterilization," and "Care of Instrumentation." Additional education material resources, such as pharmaceutical houses and manufacturers of hospital instruments, should be identified and utilized when the OR technician develops the training program.

Following completion of the course, each instrument processor should provide the OR technician with specific comments regarding the effectiveness of the program, and should offer suggestions regarding program improvements. In addition, the instrument processor should provide feedback to the OR technician a month following completion of the training program. This will allow the individuals to evaluate the impact the training program has had on their effectiveness in the instrument processing room. The OR technician should evaluate progress toward achieving the training program goal.

As other critical modules are identified, the OR technician should incorporate them into the training program. These additional training modules will probably present technological advances in instrument processing equipment. By providing this form of continuous education, the instrument processors will find both job enrichment and opportunities for self-improvement.

Effective implementation of the instrument processing control chart requires the utilization of certain training aspects. Following the first month's data collection period, management should review the results displayed by the control chart. A meeting with all instrument processors and all appropriate levels of management should be conducted. An appropriate meeting coordinator might be the OR technician, since he or she may be viewed as a slightly more neutral party by the instrument processors. The focus of the meeting will be to discuss the results of the control chart, identify and eliminate sources of variation, set goals for the following months productivity level, and review any new technological advances. Discussion of control chart results should primarily focus on identifying any outliers. Extremely high productivity should be rewarded with positive comments, whereas periods of low productivity should be discussed, but negative reinforcement should be avoided. In both instances, potential sources of variation should be identified and analyzed.

An analytical approach to analyzing sources of variance depicted by the control chart is displayed in Figure 2. The first phase of variance analysis involves that meeting participants should individually brainstorm for possible explanations of variance. The meeting coordinator should then pool the ideas and present them on a flip chart. This method allows for the separation of idea generation and evaluation, which will probably facilitate increased employee/employer interaction. The ideas recorded on the flip chart should then be discussed and evaluated with respect to their potential impact as sources of variance. Evaluation of the proposed sources of variation correspondence to the second phase of variance analysis. The third and fourth phase of analysis may be conducted in a similar manner. Alternative solutions are individually brainstormed and then evaluated. An optimal action strategy to eliminate variance should be selected and the implementation requirements clearly delineated.

When properly implemented, goal setting can be a powerful instrument in elevating employee motivation and productivity. In setting goals, it is essential that management work with the instrument processors. By involving the instrument processors in the setting of specific and challenging goals, individuals will be more receptive to goal acceptance and goal attainability. A critical
Figure 2: Variance Source Elimination Process

1. Identify Potential Sources of Variance
2. Analyze Sources of Variance
3. Identify Alternative Course of Action
4. Select Optimal Action Strategy
5. Implement Action Strategy
6. Evaluate Results
7. Modify or Reject Current Course of Action
8. Accept Current Course of Action
assumption in this process is that the individual has the skills and resources necessary to achieve the goal, and receives feedback on progress toward the goal. Providing a training program with monthly reviews of worker productivity through the use of control charts will accomplish this objective.

The next meeting should begin with a review of the progress made toward goal attainment and the effectiveness of the action strategies implemented at the previous meeting. As indicated in Figure 2, effective strategies should continue to be utilized, whereas ineffective strategies should either be modified or rejected, depending on their potential usefulness.
RECOMMENDATIONS

Based on the results from the survey, four recommendations were presented. The methodology used in obtaining the recommendations has been covered in depth in the previous section. For clarity, the recommendations are listed below with brief descriptions.

• **Staffing & Scheduling Functions**

Hire an OR technician/trainer with two years college or technical school training and several years experience with instrument processing. This person would work between the hours of 8am-5pm or 9am-6pm. This would bridge the gap between the day and afternoon shifts so that the OR trainer would be able to assist almost all of the instrument processors. This person would act as a team leader/coordinator for the OR instrument processors and would do some of the more specialized trays and wraps along with the processors.

Implement two levels of OR instrument processors (I & II) with an increase in responsibility for the second level. In order to achieve this second level, the instrument processors must pass a standard test and have a certain number of years experience. The instrument processor II would then provide the OR trainer with recommendations in the areas of training methods and productivity issues.

• **Training**

Implement a standard training program for all new employees. Develop a testing method used to determine whether a processor I can advance to a processor II. The responsibility of implementation, testing, and evaluating new methods would lie on the OR trainer.

• **Control Chart**

Institute a monthly control chart (see Figure 2 in Appendix for an example). Several blank charts are provided for added convenience in implementing this productivity measure. These charts only include activity on weekdays and span four weeks. It will be the responsibility of the instrument processors and the OR trainer to tally the number of trays and wraps done per day on the group tally...
sheet, then record them on the control chart. This is a group measure of productivity so no individual needs to feel threatened by this chart.

- Monthly Meetings

On a monthly basis, all the instrument processors will meet with Vale Salkauskas, Bill Gilligan, and the OR trainer to discuss progress with training, control chart (with special emphasis on the outliers and potential problems), new technologies, policies, etc. This meeting time should be as convenient as possible for the processors so that everyone could attend.
## Table 1

### Number of Different Sets for each Division

<table>
<thead>
<tr>
<th>Division</th>
<th># of Sets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthopedic</td>
<td>63</td>
</tr>
<tr>
<td>Thoracic-Pulmonary</td>
<td>13</td>
</tr>
<tr>
<td>Otorhinolaryngology</td>
<td>20</td>
</tr>
<tr>
<td>Gynecology</td>
<td>18</td>
</tr>
<tr>
<td>General Surgery</td>
<td>20</td>
</tr>
<tr>
<td>Vascular</td>
<td>9</td>
</tr>
<tr>
<td>Sports Medicine</td>
<td>7</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>17</td>
</tr>
<tr>
<td>*Ophthalmology</td>
<td>1</td>
</tr>
<tr>
<td>Oral Surgery</td>
<td>6</td>
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<tr>
<td>Core C</td>
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</tr>
<tr>
<td>Burn Surgery</td>
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</tr>
<tr>
<td>Urology</td>
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<td>Cardiac</td>
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<tr>
<td>Plastic</td>
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</tr>
<tr>
<td><strong>Total # of Different Sets</strong></td>
<td><strong>219</strong></td>
</tr>
</tbody>
</table>

*The set for Ophthalmology is an emergency set. Eye surgeries and their corresponding sets are usually at Kellogg.*

*This list is not comprehensive. It only covers those trays that have been typed and printed prior to October 1990.*
### Table 2

<table>
<thead>
<tr>
<th>DATE</th>
<th>GAS</th>
<th>STEAM</th>
<th>NO. OF SETS(U)</th>
<th>SETS/WORKER(u)</th>
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<tr>
<td>9-18-90</td>
<td>74</td>
<td>262</td>
<td>336</td>
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<tr>
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<td>40.00</td>
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<tr>
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<td>20</td>
<td>14</td>
<td>34</td>
<td>17.00</td>
</tr>
</tbody>
</table>

W = total no. of workers
u = total no. of sets processed in a day by a single worker
U = total no. of sets processed daily
Figure 1: Control Chart

Number of Trays Processed

Days:
- Mon
- Tues
- Wed
- Thurs
- Fri

Wraps:
- Mon
- Tues
- Wed
- Thurs
- Fri

Month of

(4 week period)
### Instrument Processing Tally Sheet

**Week of ____________________________**

<table>
<thead>
<tr>
<th>Day</th>
<th>Trays</th>
<th>Wraps</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
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<td></td>
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<tr>
<td>F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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*University of Michigan Medical Center Management Systems*
Lesson Plan Outline

I Preliminary Review

1. Review previously covered material
2. Note student experience and knowledge which relates to the concept to be introduced
3. Incorporate steps 1 and 2 in preparing the foundation for introduction of the new concepts

II Introduce New concepts

1. Provide name of concept
2. Explain behavioral objectives related to concepts
3. Highlight main points within the objective

III Detail New Material

1. Explain new points step-by-step
2. Utilize audiovisual aids which emphasize points
3. Repeat main points

IV Practice

V Summarize and Review

(as described in Grubb and Mueller)
OR Instrument Processor's Survey

This survey is for a report currently in process by three students in an Industrial Engineering class. Some of you have already met with us. Our report concerns analyzing your job in order to make it easier on you and more efficient at the same time. We would appreciate your time and request that each person complete one survey. The surveys are anonymous and the results will be kept strictly confidential.

Please specify the number of years/months that you have worked within the Instrument Processing Room: ___________________

What shift do you work? (Circle one) Days Afternoons Nights

Do you work weekends? (Circle one) Yes No

TRAINING:

1. Please check the type of training you've received (leave blank any answers that don't apply, you can check more than one):

   - Books, reference sheets, instructional aids: ______
   - Hand-On training, personal help: ______
   - Video: ______
   - Classroom instruction: ______
   - Other: (Specify:___________________________) ______

2. Who provided the hands on training, and how much?

<table>
<thead>
<tr>
<th>Trainer</th>
<th>Length of Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor:</td>
<td>______</td>
</tr>
<tr>
<td>Fellow worker:</td>
<td>______</td>
</tr>
<tr>
<td>Nurse:</td>
<td>______</td>
</tr>
<tr>
<td>OR Tech:</td>
<td>______</td>
</tr>
<tr>
<td>Other: (Specify:__________)</td>
<td>______</td>
</tr>
</tbody>
</table>

3. How much formal training have you received? (Weeks, months, etc.)

   __________________________

   Describe any comments you have regarding your training:

   __________________________

WORKLOAD:

1. At what periods during your shift are you the most busy?___________

   Least busy? __________________________
2. How often in an average week do you work into your lunch hour? (Check one)
   Frequently: _____
   Sometimes: _____
   Rarely: _____
   Never: _____

3. How many breaks (on average) do you take during the day? _______
   What is the average length of your breaks (minutes)? _______

   Describe any comments you have regarding workload:

   ________________________________

PRODUCTIVITY:

1. On average, how often does a nurse, tech, doctor, etc. come in and ask you for an instrument in any given day? (Check one)
   Frequently: _____
   Sometimes: _____
   Rarely: _____
   Never: _____

2. What percentage of trays that you prepare in a day, have missing items? (Check one)
   100-75%: _____
   74-50%: _____
   49-25%: _____
   24-0%: _____

3. What percentage of your time is spent in any given day, outside the OR Instrument Room? (Examples: getting instruments to/from Mott, tracking down instruments, going to/from CSS) _______

   Reasons: ________________________________

   ________________________________

   Describe any comments you have regarding productivity:

   ________________________________

Thank you for taking time to fill out our survey. Remember there is no right or wrong answer. We just appreciate your input and have enjoyed your comments and participation.

Julie Eberhard, Kathleen Gerzevitz, Kathy White
ADDITIONAL REFERENCES


