Department of Radiation Oncology

Final Report
Department Analysis

Management Systems Department

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EXECUTIVE SUMMARY

Introduction

The Department of Radiation Oncology (DRO) at the University of Michigan Medical Center (UMMC) is at the forefront of the technological and clinical advances that are revolutionizing the field of therapeutic radiology. Innovation has been a hallmark of the DRO throughout its history. The department continues to grow in size, activity, and stature, and is dedicated to the maintenance of clinical and academic excellence and to the exploration and application of new ideas in the field of therapeutic radiology. To continue this tradition there is an increasing need for greater efficiency and a continual pursuit of quality care.

Through obtaining an efficient system in which to work, the activities of patient care, research, and teaching will be able to continually meet new demands and flourish. Recognizing this need is the first step in continued improvement. However, more than recognition is necessary to attain the high level of excellence desired. To meet this need, the DRO has teamed up with the Management Systems Department (MSD) to conduct a study of the current system and determine a procedure for continual improvement.

Purpose

This study was conducted to improve the overall efficiency of the clinic in DRO by minimizing patient waiting times and achieving the highest possible quality care.

Goal

The goals of the study were the following:
• To offer scheduling and practice recommendations which will decrease cost and increase efficiency.
• To enable the DRO to achieve continual improvement. This will increase the quality of service delivered to patients.

The study findings were as follows

• The present scheduling system is very inefficient. Appointments take longer than scheduled. Physicians are expected to be in more than one place at a time.

• Dr. Howard Sandler is most efficient overall. Saw the most patients during data collection. Spent as much time with patients as other
EXECUTIVE SUMMARY

physicians on average. He compartmentalizes his schedule. He uses time management tools.

- Having one physician see patient during Follow-Up and On-Treatment visits decreases first physician encounter until checkout time by 9 minutes and 6 minutes respectively. However, the wait time in the lobby increases by 6 minutes and 8 minutes respectively.

- Patients for 8:30 appointments wait for 38 minutes to be seen by physician.

- Clinic schedules are created too far in advance

- Physicians in lab most have longest overall wait times.

- Present schedule (April-June) is over-scheduled on Wednesday and Thursday, and under-scheduled on Friday.

- Present notification process of patient arrival and exam room placement to the physicians is very inefficient.

- Having all required materials (charts, x-rays, etc.) present before patients arrive is a significant problem.

- 30 percent of consent forms for Simulation not signed during Consult visit.

- Exam rooms are being used as waiting rooms.

- Patients arrive early, however close to their scheduled appointments.

- Overall room utilization is 54 percent.

Recommendations

- Compartmentalize the schedule. That is, schedule certain types of treatments on the same day and other treatments on the other days.

- Schedule by the "shortest service time first".

- Increase the allotted time for Consult visits to one and one half hours.

- During busy times, a Follow-Up patient should be seen by just the staff physician. For On-Treatment patients, have just the resident or staff physician see the patient during busy times. To maximize this effect, the
EXECUTIVE SUMMARY

decision to do so must be made earlier, not after the patient has already waited excessively.

• Schedule patients at 9:15 A.M. as opposed to 8:30 A.M..

• At least one physician should not attend the conference each day of the week, and schedule On-Treatment patients as early as possible.

• Tighter conference schedule. Start on time. Finish on time.

• Develop new clinic schedules every one or two months.

• Use the utmost discretion in canceling clinic days.

• At least one physician from Wednesday or Thursday morning should be rescheduled for Friday morning.

• Make use of present computer system for notification of patient arrival and placement in an exam room, as well as for data collection.

• Designate specific responsibilities to a position that can effectively find charts, x-rays, relevant history, etc..

• Have all the materials collected and prepared so that the physician has little if any pre-visit paperwork to complete. Also possible for physician to review prior to start of clinic.

• Have the search and the gathering of materials begin at least one day before the patients scheduled visit.

• Get consent form for Simulation signed during Consult visits.
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INTRODUCTION & BACKGROUND
Introduction

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This study was conducted to improve the overall efficiency of the clinic in the DRO by minimizing patient waiting times and achieving the highest possible quality care.

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To offer scheduling and practice recommendations which will decrease cost and increase efficiency. To enable the DRO to achieve continual improvement. This will increase the quality of service delivered to patients.

Background

To make these recommendations, MSD has gathered data and collected information concerning patient flow times and operating procedures. MSD, physicians, nurses, and patients were all responsible for collecting data and information. This was accomplished during operating clinic sessions without impacting clinic operations. In addition, root cause analysis of data was performed through the use of statistics, spreadsheets, flowcharts, and graphics. A simulation model using the GPSS/H language was developed of the clinic to perform analysis of physician assigned rooms (current method) versus the use of pooled rooms (proposed method). Refer to the Approach and Methodology section for a further expansion of study procedures.
DEFINITION OF TERMS
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Clerk
Part of the Department of Radiation Oncology (DRO) staff. Supervises the reception desk, schedules patients, and answers various general patient questions.

Clinic
The clinic is the location where cancer patients come to for five types of visits:
- Consult
- Follow-Up
- On-Treatment
- Simulation
- Unscheduled

The boundaries of the clinic are defined as:
- Lobby/waiting room, and reception area
- Nurse/Nurse Aide station
- Eight exam rooms used to service cancer patients
- Two simulation rooms
- Physician work room
- Bathrooms
- Social Work room

Note: Refer to Appendix A for clinic layout.

Consult Visit
Type of visit where a patient is seen to discuss type of treatment modality which will be used. Patient is informed of clinic and radiation processes. Patient was previously diagnosed with cancer.

Follow-Up Visit
Type of visit where the patient attends to exam the effectiveness of past treatment and discuss any future needs.

Nurse
Part of DRO staff. Brings patients to exam rooms. Prepares patients to be seen by physician. Asks pertinent background questions. Answers any questions patient may have. Aides in all areas of patient care.
**Nurse Aid**
Part of the DRO staff. Brings patients to exam rooms, helps the nurses with daily activities, and answers various general patient questions.

**On-Treatment Visit**
Type of visit in which patient is seen weekly by his/her physician during the course of radiation therapy.

**Patient Flow**
The process which patient goes through within clinic from checking in at the reception desk until checking out of the system.

**Resident Physician**
Member of RadOnc staff. Recent graduate of medical school. Receiving training (residency) in RadOnc. Residents assist staff physicians with all clinical care.

**Simulation Visit**
Visit which determines general area of radiation therapy and simulates final treatment set-up.

**Staff Physician**
Part of the DRO staff. Primarily responsible for the care and treatment of patients and the training and education of the resident physicians.

**Unscheduled Visit**
Visit where patients come to clinic because of urgent needs for care while under treatment. The patient does not have an appointment.
APPROACH & METHODOLOGY
Several technology and application oriented methodologies presented below were used by the Management Systems Department (MSD). These methodologies were applied to develop a deep fundamental understanding of the Department of Radiation Oncology (DRO) clinic. The basic goal, in utilizing these methodologies, was to develop an understanding of the current system, define areas of improvement, and make suggestions for improvement.

Methods:
- Flow Diagram Analysis
- Interviews
- Data Collection
- Sensitivity Analysis
- Decision Analysis
- Questionnaire
- Organizational Analysis
- Simulation Program

* Please note that these methods are not mutually exclusive. Rather they are quite interdependent.

Flow Diagram Analysis

MSD performed an analysis of the DRO Micro Flow Diagram (Appendix B). This enabled MSD to obtain a broad overview and understanding of the current clinic system. In addition, MSD was able to determine possible bottlenecks and areas of investigation.

Interviews

MSD conducted weekly interviews of: administrators, staff physicians, resident physicians, nurses, nurse aides, and clerks. This enabled MSD to obtain a sound understanding of the flow process, the overall system, and the problems confronting the department and personnel on a daily basis.

Data Collection Forms

Patient data collection forms (see Appendix C) were developed on 2/20/94 to collect data on patient processing times. It was determined that a month long study was necessary to obtain at least 20 to 25 data points for each physician for the given type
of visits under study. Furthermore, these forms were designed to have the actual clinic patients fill them out. This was done for three reasons.

First, Health Care has traditionally been a non-interactive environment. In the past, patients passively sat and waited for treatment, while having little impact on overall visit. In an effort to change this situation and allow communication from actual patients, MSD decided to ask the patients to complete a portion of the data collection forms. Furthermore, patients know that a problem existed within the department. By acknowledging that the problem existed and allowing the patient to aid in its correction, patients feel more comfortable within the current system.

Second, MSD felt that patients would be able to fill out the forms more accurately. This is because patients have more time to fill out the data collection forms, while the DRO staff's time is limited. By having the data collected by the patients, MSD was successful in obtaining more accurate data than what would have been collected otherwise.

Third, DRO has long been known as an innovator in all respects. Having patients fill out data collection forms has never been done before. By enabling the patients to fill out the data forms, an innovative approach has been undertaken. This process could form a new approach to further study within the Healthcare field.

The month long data collection process began on 2/24/94 and ended on 3/25/94. Accompanying the data collection forms was a memorandum to the DRO patients (see Appendix D). This memorandum explained the reasons for the current study and the process in filling out the data collection forms.

Sensitivity Analysis

MSD utilized this approach to analyze the system input variables to determine changes in system output. Because of uncertainty in input data, it is useful to know over what range the solution of a problem remains unchanged.

This method allowed MSD to visualize how changing one parameter out of a given set of inputs affects the output. By determining which inputs are sensitive and insensitive, MSD was able to evaluate which inputs are most important and which are limiting factors. This method was utilized throughout the entire project.
Decision Analysis

Decision analysis is a powerful analytical tool used to support and aid the decision-making process. MSD utilized this method to:

- Identify problems and aid in the structuring of the simulation model (discussed in detail later in this section).
- Identify the likelihood and magnitude of changes.
- Perform sensitivity analysis of system to determine the robustness of recommendations.
- Evaluate the implementation of strategies suggested.

Questionnaire

MSD utilized this technique to gather additional information from the DRO staff. A questionnaire was distributed to all staff which stated general questions and asked for input from the individuals within the department (see Appendix E). The questionnaire had the following advantages.

- Permitted the creation of a group larger than would have otherwise been possible. This enabled MSD to obtain everyone's input. Many times people have suggestions, but these suggestions are never voiced.
- Participants were not subject to social pressure, due to the anonymity of the summarized information. Therefore, the responses were more reliable.

Organizational Analysis

Everything mentioned thus far has been a form of organizational analysis. The goal of organizational analysis is to design and structure individual jobs and the relationship among these jobs. Ultimately, the goal of organizational analysis is to create the framework for "positive" group and individual behavior. This will allow an entity (staff physician, resident physician, nurse, etc.) to function and accomplish its objective effectively and efficiently within the department. MSD has made suggestions regarding job descriptions and lines of communication that will provide an effective approach to aid DRO in its transition process. In addition, DRO will be in a position to better adapt to problem solving for current and/or new circumstances.
Simulation Program

Simulation is a decision making tool used to imitate the "real-world" (DRO, in this case). This tool enables the analysis of system reactions to various operational changes without interfering with people, places, and/or things.

The behavior of a system as it evolves over time is studied by developing a simulation model. This model usually takes the form of a set of assumptions concerning the operation of the system.

A system is the collection of objects forming a whole with relationships between them which interact for the purpose of accomplishing objectives according to a plan. A set of limiting boundaries are placed around this system to define the scope and purpose of the model.

The simulation model was formulated to analyze the impact of switching from the current physician allocated room system to the use of physician pooled rooms.
DESCRIPTION OF CURRENT SYSTEM
Scheduling Practices
The Department of Radiation Oncology (DRO) schedules four types of visits: On-Treatment, Follow-Up, Consult, and Simulation. Clinic schedules are created quarterly within DRO. These schedules list which staff physicians see patients in clinic for each day and how many of each type of visit they see throughout the day. See Appendix F for a copy of the current April - June clinic schedule.

Currently only one physician schedules patients on Fridays. Four physicians are scheduled on Mondays and Tuesdays, and five physicians are scheduled on Wednesdays and Thursdays. A summary of the current scheduling practices are given in Table 1.

Table 1 - Scheduling Practice for Each Physician

<table>
<thead>
<tr>
<th></th>
<th>1st Patient</th>
<th>2nd Patient</th>
<th>3rd Patient</th>
<th>4th Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>On Treatment</strong></td>
<td>Patients scheduled every 15 minutes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scheduling starts at 7:00 am</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Consult</strong></td>
<td>8:00 AM</td>
<td>10:30 PM</td>
<td>1:00 PM</td>
<td>2:30 PM</td>
</tr>
<tr>
<td><strong>Follow Up</strong></td>
<td>9:00/9:30</td>
<td>10:00/10:30</td>
<td>11:00 AM</td>
<td>1:00 PM</td>
</tr>
<tr>
<td>Further scheduling until 3:30 PM every 30 minutes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Simulation</strong></td>
<td>Scheduled from 8:00 am until 3:30 PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scheduled approximately every 60 minutes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Unscheduled</strong></td>
<td>Patients arrive at random</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approximately four patients per day (one per physician)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Clinic Rooms
There are eight exam rooms within the clinic. The exam rooms are used to see the five types of patients listed in the above table. All exam rooms are equally equipped, except for minor variations in two of the rooms. One exam room is typically reserved for unscheduled visits or other similar events.

There is also a physician workroom in which the physicians study their patients' charts, and anything related to their work. At the front of the clinic is the social-work room, in which the social worker meets with patients regarding any financial matters, personal problems, etc.
Staff
The DRO clinic staff consists of the staff physicians, resident physicians, nurses, nurse aides, clerical staff, and administration. There are eight staff physicians and numerous resident physicians within the clinic. There is a physicians meeting in the conference room each morning at 7:30 am where the physicians discuss daily patients and events, work practices, and resident physician education.

There is presently no exact job description for the nursing staff in relation to the nurse aides and physicians. This has resulted from no formal policy stating the general or specific job requirements for each staff position. There has been no consistent practice which the staff uses to perform duties within the clinic.

Patient Flow Communication
Patient flow within DRO is communicated primarily by means of paper and little by computer. DRO uses their computer information system to record patient arrival by placing an asterisk next to the patient's name. However, this is currently the only purpose for which the computer system is used. After this, patient flow is recorded by writing down patient arrivals to the exam rooms on a piece of paper in the Physician Workroom.
FINDINGS & CONCLUSIONS
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Finding 1
The present scheduling system is not accurate. Physicians are expected to be in two to five places at any given time. Obviously this is impossible. However, the schedule does not currently account for this, which is a major reason why patients have excessive waiting times. Furthermore, Management Systems Department (MSD) has found that certain types of visits take x+y minutes, when they are only scheduled for x minutes. One such example is that of the Consult Visit, which is scheduled for 1 hour. However, our data shows that these visits take significantly longer than this.

Conclusion 1
An improvement to the scheduling system is definitely needed. Any improvement in this system will have the biggest impact on the patient waiting times.

Finding 2
Dr. Howard Sandler is the overall most efficient physician in the Department of Radiation Oncology (DRO). He serviced the most patients during the data collection period while spending on average the same amount of time with each patient as the rest of the clinic. He compartmentalizes his schedule and uses time management tools.

Conclusion 2
Compartmentalizing the schedule by scheduling only certain types of visits on some days and other types of visits on other days reduces wait time. In addition, any type of time management tool is beneficial to the physician, which in turn benefits the customer. However, the choice to do so is personal preference.

Finding 3
Physicians in Lab most often (in clinic least), which are TL and ER, have the longest wait times. Appendix G - Graphs contains this data in Graphs 8, 9, and 10.

Conclusion 3
The current scheduling practices for these physicians must be changed to accommodate their limited time in clinic.

Finding 4
When only the staff physician sees the patient during a Follow-Up visit, the time from first physician encounter until checkout decreases by nine minutes. Furthermore, when only one physician (resident or staff) sees the patient in an On-Treatment visit, the time from first physician encounter until checkout decreases by
six minutes. However, the wait in the lobby increases by six minutes for a Follow-Up visit, and eight minutes for an On-Treatment visit, when only one physician sees the patient.

**Conclusion 4**
The increase in wait time for the patient that only sees one physician indicates that the physician is making the decision to see a patient by oneself too late. In addition, the practice of having only one physician see the patient on these particular visits does not sacrifice a large amount of educational value, especially since the resident physician can see the On-Treatment patients by themselves. MSD believes that the decrease in waiting time to the patient outweighs the educational value that may be lost.

**Finding 5**
Each morning between 7:30 and 8:30 A.M. a physician conference is scheduled to discuss:
- The days planning and events.
- Past events/problems and resolutions of problems.
- Future events and needs planning.
- Resident education

Patient scheduling begins at 8:30 A.M. However, the conference rarely finishes at 8:30 A.M., and once the conference ends physicians typically become involved in other areas outside clinic:
- Dosimetry
- Simulation
- Treatment Rooms

This causes patients scheduled at 8:30 A.M. to wait for extended periods of time before being seen. In addition, this wait time (queue) perpetuates throughout the rest of the day, backing up the entire system.

**Conclusion 5**
This is a major problem area. The 38 minutes that a patient has to wait for the first appointment of the day is unnecessary. This 38 minutes perpetuates through the system the entire day, causing excessive wait times.

**Finding 6**
Currently schedules are created every three months. This increases the possibility for ineffective communication between physicians and the clinic. Also, physicians can cancel clinic appointment times easily, with very little notice.

**Conclusion 6**
Better coordination should be undertaken by physician to inform clinic far in advance of absence. Cancellations bring about extra costs since clerical staff must spend time notifying and rescheduling patients. However, a time frame for scheduling should be developed, as it is rather difficult to determine ones schedule three months in advance. MSD realizes that many unexpected responsibilities occur with little notice.

Finding 7
Physician schedules were overloaded in morning during the data collection period. This caused early back-up in the system. This was further perpetuated by the lateness of physicians to clinic.

In the present schedule (April-June, see Appendix F), the clinic is overscheduled on Wednesday's and Thursday's. Furthermore, only one physician is currently scheduled in clinic on Friday.

Conclusion 7
A scheduling system should be developed which addresses the issue of overloading schedules in morning. Patient scheduling should be made evenly throughout the day.

Some physicians should switch days in clinic from Tuesday and Thursday to Monday and Friday. This will alleviate some of the scheduling problems experienced on Tuesday and Thursday. Furthermore, with more physicians in clinic on Fridays, utilization of staff and clinic will increase. This will also alleviate pressure from other scheduled days, thus reducing the average wait time while also decreasing costs, as less overtime will be needed on the busy days.

Finding 8
The nursing staff presently lets the physicians know when the patients arrive by writing the information on a piece of paper in the Physician Workroom. Furthermore, the nurses occasionally do not promptly put the information on the paper. Consequently, there are times when the physicians can see the patient but have no idea that they are even present, or in an exam room waiting to be seen. Furthermore, there is presently a computer scheduling system that can give updated information about patient status to all interested parties. However, this system is not being utilized other than to determine if a patient has arrived at the clinic.

Conclusion 8
This is an area of technological improvement, or just implementation of present technology within the department.
Finding 9
Like in most healthcare settings, having charts and x-rays present when the patient arrives is a significant problem.

Conclusion 9
Consequently, every step possible should be taken to reduce or eliminate this problem. Any improvement is an obvious decrease in waiting time for the patient, while also increasing the utilization of the staff.

Finding 10
The following table illustrates who places the patient into the exam rooms for Consult, Follow-Up, and On-Treatment visits.

<table>
<thead>
<tr>
<th>Distribution of Patient Placement Into Exam Rooms by Nurses and Nurse Aides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse</td>
</tr>
<tr>
<td>Nurse Aide</td>
</tr>
</tbody>
</table>

Conclusion 10
These percentages show that more definition is needed in their respective job descriptions. Having this much overlap in tasks creates room for frustration and miscommunication and confusion between the two positions.

Finding 11
The Simulation consent form is supposed to be signed by the physician during the patient Consult visit. However, frequently the consent form is not signed during this visit. In fact, 30 percent of the time the consent form is not signed until right before simulation.

Conclusion 11
Once again this causes excess waiting time for every patient of that particular physician. Thus, a few minutes spent getting the consent form signed during the Consult visit is a reduction in overall wait time. The physician will not be spending time on unscheduled tasks when there are scheduled tasks to be completed.
Finding 12
Exam rooms are being utilized as waiting rooms through the shifting of patients from the lobby to the exam room. A graphical representation showing time waiting in an exam room until first physician encounter is given in Graph 6 in Appendix G.

Conclusion 12
The current system is hiding the "work-in-process" by using the exam room as another waiting room.

Finding 13
Patients on average arrive early, however they are close to arriving at their scheduled appointments. For a Simulation visit, the patients arrive significantly early for their appointments. Graphs 3 and 4 in Appendix G illustrate the overall wait times in the lobby along with the arrival patterns of the patients for each type of visit.

Note:
1) Arrival pattern = Appointment Time - Arrival Time
2) Not applicable to unscheduled visits.

Conclusion 13
The arrival pattern of patients is not a significant factor in their overall wait time.

Finding 14
The overall utilization of rooms is 54 percent. The breakdown by day of the week is given as Graph 1 in Appendix G. Furthermore, the results of the simulation program show no difference in exam room utilization when using the present system of physician-allocated exam rooms compared with using a pooled exam room system (the pooled exam room system is where the physician sees the patient in the first exam room available).

Conclusion 14
The calculations show that the bottleneck of patient flow within the clinic is not the number of exam rooms. Thus, there are presently enough exam rooms available, and few changes need to be made at this point in time. The reason the utilization percentages for the exam rooms did not change in the simulation program is because the exam rooms are currently so under-utilized that it doesn't matter which exam room system is used. However, MSD feels that after exam room utilization percentages increase (to approximately 80% or better), DRO should use the pooled exam room system rather than the current physician-allocated system. MSD feels that this common sense method would only further increase exam room utilization.
Finding 15
Patients consistently need their blood drawn prior to being seen by a physician. However, this is consistently not done nor realized until the patient arrives for their appointment. This is another area where the patient flow process can be slowed significantly.

Conclusion 15
Further investigation into the possible solutions for this problem is necessary. See the Recommendations for Further Study section.

Finding 16
There is no discernable decision process for the assignment of rooms by the nurses with respect to the physicians or to the patients.

Conclusion 16
Further investigation into this decision making process is needed. However, if appointments are scheduled by "shortest service time first", the only guideline to follow would be to place patients in exam rooms by appointment time. Patients arriving late should be seen in the first available exam room after being notified of their tardiness and how it causes increased waiting times for all patients.
RECOMMENDATIONS
RECOMMENDATIONS

Recommendations for Finding 1

1) Compartmentalize the schedule. Schedule Consults and Follow-Ups on one day and schedule On-Treatments and Follow-Ups the another day.
2) Schedule by the "shortest service time first" whenever possible.
   e.g. Schedule Follow-Ups before Consults. Schedule On-Treatments before Follow-Ups.
3) Increase the allotted time for Consult visits from one hour to one and a half hour.

Benefits
Compartmentalizing the schedule smoothes the daily tasks of the physician. By doing this one naturally becomes more efficient. This also simplifies the decision process by which nurses place patients into exam rooms.

Sheduling by the "shortest service time first" will significantly decrease the overall wait time of the patient.

Increasing the allotted time for Consult visits will smooth the daily schedule. Overall patient wait times will be reduced.

Support
Dr. Howard Sandler presently compartmentalizes his schedule. He is also one of the most efficient physicians in the clinic with respect to wait times.

Recommendations for Finding 2

Compartmentalize the schedule. (See part one of Recommendations for Finding 1.) Furthermore, use any time management tools such as placing a hardcopy of the physician's schedule in a visible place.

Benefits
Put simply, it is a tool for effective time management. This enables one to have an overall picture of the schedule and allows one to plan accordingly. This also helps make decisions about busy times earlier. Any advantage such as this one should be used by other physicians. It is an obvious benefit, illustrated by Dr. Sandler's efficiency. However, such a policy cannot be implemented as this is personal preference.
Support
Data collection. Interviews. Observation.
Dr. Sandler's lower than average wait times and service times with respect to the clinic wait times, while seeing the most patients during data collection.

Recommendations for Finding 3

Need extended appointment times for research-focused physicians. The ability to compartmentalize types of treatments is limited since these physicians are only in clinic for 1.5 days. However, this can still be done by dividing up the mornings and afternoons in the same fashion.

Benefits
See above benefits for Finding 1.

Support
Data collection.
See graphs 8, 9, and 10 in Appendix G

Recommendations for Finding 4

1) For a Follow-Up visit, have just the staff physician see the patient in busy times.
2) For an On-Treatment visit, have just the resident physician or just the staff physician see the patient during busy times.
3) When recommendations 3 and 4 are done, the decision to do so must be made earlier, not after the patient has already waited excessively. See graphs 15 and 16 in Appendix G.

Benefits
Having only one physician see the patient during busy times for both a Follow-Up and On-Treatment visit will make up for excessive waiting by the patient. If the decision to see a patient by oneself is made when the patient arrives, the overall wait time will decrease significantly. The early decision will eliminate the longer wait time that a patient experiences in the lobby when they are only seen by one physician than when they are seen by more than one physician.

Support
Data collection. Interviews. Questionnaires.
This is presently done by some of the physicians in the clinic.
See graphs 14 and 15 in Appendix G.
Recommendations for Finding 5

1) Schedule patients at 9:15 A.M. as opposed to 8:30 A.M.
2) At least one physician should not attend the conference each day of the week.
3) Schedule On-Treatment patients as early as possible.
4) Tighter conference schedule. Start on time. Finish on time.

Benefits
Physicians can be involved with other necessary areas outside the clinic without making a patient wait. Eliminates the 38 minute wait at the start of the day that perpetuates through the system the entire day.

Support
Data collection. Interviews. Questionnaire responses.
Dr. Lori Pierce presently schedules On-Treatment visits at 7:00 A.M.

Recommendations for Finding 6

1) Develop new clinic schedules every one or two months.
2) Use the utmost discretion in cancelling clinic days.

Benefits
Will decrease the amount of wasted time rescheduling appointments. Subsequently, the clerks will have more time to spend preparing charts, x-rays, etc. Most importantly, the customer will experience fewer inconveniences.

Support
Interviews. Questionnaires.

Recommendations for Finding 7

1) At least one physician from Wednesday or Thursday morning should be rescheduled on Friday morning.
2) Smooth the schedule. e.g. Switch two of AE’s Follow-Ups from Wednesday afternoon to Monday afternoon.

Benefits
Moving at least one physician to Friday morning will smooth the schedule dramatically. A decrease in overtime, an increase in physician efficiency, and most importantly, a decrease in wait time for patients will result. This will also utilize the staff more efficiently on Friday morning, since the work schedule is the same regardless of the number of physicians in the clinic.
Support
Data collection.
Expected room requirements for April schedule (see Appendix F - Clinic Schedule).
Current exam room utilization percentages (see Graph 1 in Appendix G)

Recommendations for Finding 8

1) The nurse or nurse aid should enter into the existing computer system the exam room number, time of placement, etc. of the patient at the appropriate time.
2) Hook up terminals into areas or rooms where they are necessary.
3) Possibly purchase a larger monitor to place in the Physician Workroom so that a visible tracking system is at their disposal.

Benefits
By the increased use of the computer system, the "paper" methods should be gradually eliminated. The computer tracking system will give real time status of patients, such as arrival time, what exam room they were placed in and what time, overall cumulative waiting time, diagnosis, type of appointment, and much other important information.

Displaying such information will reduce the risk of miscommunication between the clinic staff and the physicians. It will also give administrators the opportunity to see the patient flow process at any time, thus giving them a beneficial tool to improve the patient flow process. They will be able to prevent problems from occurring, while also enabling them to find the root cause of problems, since they will realize the problems when they occur as opposed to a few hours or a day later.

The computer system will also enable them to chart their progress towards continually reducing the overall patient wait time by recording the patient service and wait times. In addition, using this system will eliminate the excessive time nurses presently use to inform the physicians of patient status. Finally, the physicians will always be able to know when there is a patient waiting for them.

Support
Observation. Interviews. Questionnaires.

Recommendations for Finding 9

1) Designate specific responsibilities to a position that can effectively find charts, x-rays, relevant history, etc., and that can also follow through to ensure the materials arrival to the clinic.
2) Have all the materials collected and prepared so that the physician has little if any pre-visit paperwork to complete.
3) Have the search and the gathering of materials begin at least one day before the patients scheduled visit.

Benefits
Having one position responsible for the collection of materials will eliminate the possibilities for miscommunication. Eliminates the overlapping searching for materials. If all materials are prepared before the physician is set to see the patient, the physician's time will not be spent on tasks that can be completed by someone else. Starting the search on the previous day will increase the percentage of complete materials by the appointment time.

Support
Interviews. Questionnaires. Observation.

Recommendations for Finding 10
Define what position (nurse or nurse aide) should perform which tasks.

Benefits
Eliminates miscommunication between the two positions. Eliminating miscommunication ultimately results in higher quality service delivered to the patient. However, please note that help from one another is necessary during busy times.

Support
Data collection. Interviews. Questionnaires.

Recommendations for Finding 11
Take every step possible to have the consent form signed during the Consult visit, unless the patient can not sign it at that time. Otherwise, do not let the physician be the reason for an unsigned consent form.

Benefits
Will eliminate the excess waiting time that arises when the physician has to leave scheduled tasks to complete an unscheduled task. Will enable smoother clinic flow. Will eliminate the time someone has to spend to tracking the physician down. Will also eliminate time spent in an exam room if the patient is waiting for the signature in an exam room.

Support

NOTE:
There are no recommendations for Findings 12 - 16 due to their nature.
Recommendation for Finding 1

1. Compartmentalize the schedule. Schedule Consults and Follow-Ups one day and schedule On-Treatments and Follow-Ups the another day.
2. Schedule by the "shortest service time first" whenever possible. e.g. Schedule Follow-Ups before Consults. Schedule On-Treatments before Follow-Ups.
3. Increase the allotted time for Consult visits from one hour to one and a half hour.

Implementation
Follow the recommendations, and schedule accordingly.

Responsibility
• Administration
• Physicians
• Clerks

Time Horizon
Two months. When new schedule is developed in June.

Recommendations for Finding 2

Compartmentalize the schedule. (See Recommendations for Finding 1.) Furthermore, use any time management tools such as placing a hard copy of the physician's schedule in a visible place.

Implementation
Follow the recommendations, and schedule accordingly.

Responsibility
• Administration
• Physicians
• Clerks

Time Horizon
Two months. When new schedule is developed in June.

Recommendations for Finding 3

Implement all recommendations for finding 1. The ability to compartmentalize types of treatments is limited since these physicians are only in clinic for
one and a half days. However, this can still be done by dividing up the mornings and afternoons in the same fashion.

Implementation
Makes changes when the schedule is developed. Discuss possible solutions among responsible parties.

Responsibility
- Dr. Lawrence and Dr. Radney
- Chairman
- Associate Chairman
- Administration
- Clerks

Time Horizon
Immediately discuss possible alternatives. Two months. When new schedule is developed in June.

Recommendation for Finding 4

1. For a Follow-Up visit, have just the staff physician see the patient during busy times.
2. For an On-Treatment visit, have just the resident physician or just the staff physician see the patient during busy times.
3. When recommendations 1 and 2 are done, the decision to do so must be made earlier, not after the patient has already waited excessively.

Implementation
Discuss the advantages and reasons for these recommendations to all the staff and resident physicians.

Responsibility
- Chairman
- Associate Chairman
- Physicians

Time Horizon
Immediately

Recommendations for Finding 5

1. Schedule patients at 9:15 A.M. as opposed to 8:30 A.M..
2. At least one physician should not attend the conference each day of the week
3. Schedule On-Treatment patients as early as possible.

Implementation
Have a meeting between physicians and remaining staff to discuss the advantages of having these schedule changes. Then schedule accordingly.

Responsibility
• Physicians
• Administration
• Clerks

Time Horizon
Two months for parts 1 and 2. When new schedule is developed in June. Immediately for part 3.

Recommendations for Finding 6
1. Develop clinic schedules every one or two months.
2. Use the utmost discretion in canceling clinic days.

Implementation
Prepare the schedules monthly if possible, if not, schedule every two months. Reclarify in meetings the importance of being in clinic.

Responsibility
• Administration
• Physicians
• Clerks

Time Horizon
Two months. When new schedule is developed in June.

Recommendations for Finding 7
1. Take one physician from Wednesday or Thursday morning and schedule them for Friday morning.
2. Take steps to smooth the clinic schedule. e.g. Switch two of AE’s Follow-Ups from Wednesday afternoon to Monday afternoon.

Implementation
Take the necessary steps given in the recommendations, and schedule accordingly.
Responsibility
• Physicians
• Administration
• Clerks

Time Horizon
Two months when the new schedule is made.

Recommendations for Finding 8
1. Have the nurse or nurse aide enter into the present scheduling system the exam room number, time of placement, etc. of the patient at the appropriate time.
2. Hook up terminals into areas or rooms where they are necessary.
3. Possibly purchase a larger monitors to place in the Physician Workroom so that a visible tracking system is at their disposable. The "paper" method should be eliminated.

Implementation
Consultation with a management systems engineer, the staff programmer within DRO, nurses, physicians, and administration, about the possible alternatives in implementing this recommendation.

Responsibility
• Administration
• Nurses
• Physicians
• Staff Programmer

Time Horizon
Immediately. However, a few months until a bug free system is in place. Possibly sooner, depending on the commitment and priorities of the responsible parties.

Recommendations for Finding 9
1. Designate specific responsibilities to a position that can effectively obtain charts, x-rays, relevant history, etc., and follow through to ensure the materials arrival to the clinic.
2. Have all the materials collected and prepared so that the physician has little if any pre-visit paperwork to complete.
3. Have the search and the gathering of materials begin at least one day before the patients scheduled visit.
Implementation
Have a meeting among administration, nurses, nurses aides, and clerks, coupled with input from the physicians, determine who can fit this role most effectively.

Responsibility
• Administration
• Nurses
• Nurse Aides
• Clerks

Time Horizon
Immediately.

Recommendations for Finding 10

Define what position (nurse or nurse aid) should perform what tasks.

Implementation
Discuss what position can most effectively deal with these tasks.

Responsibility
• Administration
• Nurses
• Nurse Aides

Time Horizon
Immediately.

Recommendations for Finding 11

Take every step possible to have the consent form signed during the Consult visit, unless the patient can not sign it at that time. Otherwise, do not let the physician be the reason for an unsigned consent form.

Implementation
Discuss the importance of reducing overall patient wait times, and how this recommendation will contribute to this goal.

Responsibility
• Administration
• Physicians, Nurses, Nurse Aides

Time Horizon
Immediately.
RECOMMENDATIONS FOR FURTHER STUDY
RECOMMENDATIONS FOR FURTHER STUDY

Data Collection Information
Information from the data collection sheets gathered can be continuously analyzed from the spreadsheets containing all of their information. The Department of Radiation Oncology (DRO) can refer to these spreadsheets at any time in the future to gather relevant information regarding their patient and clinic flow processes. The spreadsheets can be easily manipulated to gather such information as wait times, service times, and other patterns for each type of patient visit, each physician, and each day.

Computer System/Network
DRO should analyze what information would be beneficial and can be obtained with the existing and/or revised computer system. DRO should take any steps necessary to insure that all members of the staff are committed to using the computer system within the department. This will require working with the programmer and the staff to make improvements to the system so that everyone within the department can use the system efficiently and understand it (i.e., make the system "user friendly").

Job Descriptions
A more detailed job description for all staff members should be determined and made policy. This will reduce confusion and miscommunication among staff members, as well as decrease frustration for the patients and staff members. Cost benefits can also be realized through this study.

Staffing of Nurses and Nurse Aides
It is the opinion of Management Systems Department (MSD) that improvements can be made to the current staffing levels of nurses and nurse aides within DRO. MSD feels that much of the work that the higher salaried nurses currently perform can be done by the nurse aides just as well and just as efficiently (see "Job Descriptions"). Cost benefits can be realized by having a fewer number of more productive staff members. DRO should also investigate rescheduling the nursing staff to more accurately reflect clinic operating hours. This will reduce the amount of overtime paid to the nursing staff while reducing the amount of regular time being paid during less busy times (such as Friday afternoons).

Patient Exam Room Assignments
Currently there is no sound decision making process in determining the order in which certain patients should be seen. Nurses, nurse aides, and clerks should all be aware of the most efficient means of servicing any variation of a group of patients by analyzing the patients' particular service needs, their physician's work practices and schedule, the current clinic schedule, etc. This will result in less confusion for all staff members and decreased waiting times for the patients on the average.
**Hiring of a Phlebotumist**

DRO should consider hiring an in-house phlebotumist to draw patients' blood when necessary. If the frequency of this need increases, DRO should make an analysis of the situation in regards to patient waiting times, costs, and DRO present and future benefits to determine if hiring a phlebotumist would be beneficial.

**Communication between Staff Clerks**

It has come to the attention of MSD that there is currently a communication problem between the clerks at DRO. This was in response to the questionnaire that MSD distributed to the DRO staff to complete and return. DRO should investigate this matter to determine the severity of the miscommunication problem and determine what changes can be made to rectify the situation.
Department of Radiation Oncology
Questionnaire

The following is a confidential questionnaire regarding your views on clinic flow and scheduling practices. The Management Systems Department would greatly appreciate your comments so that we may use this information to improve the overall service delivered to the patients. Once again, we assure complete anonymity and no effort will be made to tie your responses to your name or position.

1. Please give your view concerning the current patient scheduling practices and list any changes you feel could be made to the current patient scheduling practices.

2. Please give your view regarding the present system of obtaining patient information such as paperwork, charts, x-rays, etc. Please list any possible changes you feel could be made to improve this system.
3. Please give any views regarding the current use and/or allocation of exam rooms. Please list any possible changes you feel could be made to improve the current use and/or allocation of exam rooms.

4. Please give any input or comments you may have regarding anything within Department of Radiation Oncology.
Appendix F: Current Clinic Schedule
Radiation Oncology
Clinic Schedule
April 1994

CN - Consults; FU - Followup; OTV - On Treatment visit; MDC - Multidisciplinary Clinic; BCC - Breast Care Clinic; ENT - Oto Clinic; PCC - Prostate Cancer Clinic

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* Only after clearance through DT/Nurse

REVISED March 8, 1994
ATT/neo
Appendix G: Graphs
LIST OF GRAPHS

Average Utilization Percent by Day - All Visits
Time Patient in Exam Room and Time Patient Serviced in Exam Room
• Percent Utilization vs. Day of Week

Average Utilization Exam Room Hours by Day - All Visits
Time Patient in Exam Room and Time Patient Serviced in Exam Room
• Average Utilization Hours vs. Day of Week

Average Arrival Pattern - All Visits
• Average Time per Patient vs. Type of Visit

Average Wait Time in Lobby - All visits
• Average Time per Patient vs. Type of Visit

Time in System - All Visits
Total Time in System and Arrival Time until Leave System
• Average Time per Patient vs. Type of Visit

Time Patient Waits in Exam Room vs. 1st Phys. Encounter until Leave - All Visits
• Average Time per Patient vs. Type of Visit

1st Physician Encounter until Leave vs. Current Scheduled Time
Times for Consult, Follow Up, and On Treatment Visits
• Average Time per Patient vs. Type of Visit

Consult Visit
Enter Exam Room until Leave and 1st Physician Encounter until Leave
• Average Time per Patient vs. Type of Visit

Follow-Up Visit
Enter Exam Room until Leave and 1st Physician Encounter until Leave
• Average Time per Patient vs. Type of Visit

On-Treatment Visit
Enter Exam Room until Leave and 1st Physician Encounter until Leave
• Average Time per Patient vs. Type of Visit

Consult Visit
Total Time in System and Arrival until Leave System
• Average Time per Patient vs. Type of Visit
Follow-Up Visit
Total Time in System and Arrival until Leave System
• Average Time per Patient vs. Type of Visit

On-Treatment Visit
Total Time in System and Arrival until Leave System
• Average Time per Patient vs. Type of Visit

Follow-Up Visit
Total Time when Res. & Staff see patient and when only Staff sees patient
• Average Time per Patient vs. Type of Visit

Comparisons of 3 Times with RP/SP vs. SP only - Follow-Up Visit
Enter Exam Room until Leave, 1st Phys. Encounter until Leave, and Arrival until Enter Exam Room
• Average Time per Patient vs. Treatment Provider

Comparisons of 3 Times with RP/SP vs. SP only vs. RP Only - On Treatment Visit
Enter Exam Room until Leave, 1st Phys. Encounter until Leave, and Arrival until Enter Exam Room
• Average Time per Patient vs. Treatment Provider

Simulation Visit - Arrival Until Leave
• Average Time per Patient vs. Physician Name

Simulation Visit - Exam Room Until Leave
• Average Time per Patient vs. Physician Name

Simulation Visit - Total Time in System
• Average Time per Patient vs. Physician Name
Average Utilization Percent by Day - All Visits

NOTES:
Utilization: Patient in any one of eight exam rooms
Utilization Percent = (Avg. serve time for each visit) * (total # of each type of visit) / Total # exam room hours per day
Total # exam room hours per day = 72 for Mon. - Thurs., 32 for Fri.
**Average Utilized Exam Room Hours by Day - All Visits**

**NOTES:**
- Utilization: Patient in any one of the eight exam rooms
- Utilization = (Avg. service time for each visit) * (Avg. # visits per day of each type of visit)
- Full Utilization for Mon. - Thurs. based on 8 exam rooms at 9 hours/day = 72 hours
- Full Utilization for Friday based on 8 exam rooms at 4 hours/day = 32 hours
Average Arrival Pattern - All Visits

Type of Visit

CONSULT 7
FOLLOW UP 12
ON TREATMENT -10
SIMULATION 37

NOTES:
Arrival Pattern = Appointment Time - Arrival Time (Negative value indicates late patients)
Not applicable to Unscheduled Visits
Average Wait Time in Lobby - All Visits

Consult
Follow Up
On Treatment
Simulation
Unscheduled

Wait Time in Lobby = Time enter exam room - Appointment time

Average Time per Patient (min)
Time in System - All Visits

NOTE:
Total time in system is calculated by using the patient's appointment time if they arrive early and their arrival time if they arrive late.
Time Patient Waits in Exam Room vs. 1st Physician Encounter until Leave for all Visits

NOTES:
(Enter exam room time) - (1st phys. encounter) = Time exam room is used as additional waiting room
Simulation Visit: Patient does not encounter physician
On-Treatment Visit

- Enter Exam Room until Leave
- 1st Physician Encounter until Leave

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Doctor Name: H3 LP
Consult Visit

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Follow Up Visit

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- Total Time in System
- Arrival until Leave System
On Treatment Visit

Physician Name

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- Total Time In System
- Arrival until Leave System
Follow Up Visit

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<th>Total Time when Resident &amp; Staff sees Patient</th>
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Comparison of 3 Times with RP/SP vs. SP only - Follow Up Visit

Patients spend approximately the same amount of time waiting to enter exam room and waiting in exam room as they do seeing the physician. Staff physicians should see the patient by themselves if the patient has been waiting for an excessive amount of time.
Comparison of 3 Times with RP/SP vs. SP only vs. RP only - On Treatment Visit

**NOTES:**
Treatment times are lower when staff or resident physician work alone
Staff and resident physicians currently only work alone if patient has been waiting in lobby for long time
Simulation Visit - Arrival until Leave

Average Time per Patient (min.)

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Simulation Visit - Exam Room until Leave

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Simulation Visit - Total Time in System

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<td>ER</td>
<td>98</td>
</tr>
<tr>
<td>HS</td>
<td>109</td>
</tr>
<tr>
<td>JR</td>
<td>61</td>
</tr>
</tbody>
</table>
APPENDICES
Appendix A: DRO Clinic Layout
Appendix B: DRO Micro Flow Diagram
Radiation Oncology Reception Desk 2-BLUE

Receptionist asks for pt.'s name & pertinent data such as films & slides.

Receptionist enters pt.'s name on computer.

Does pt.'s name appear on computer? 2-A-BLUE

Yes
  Receptionist hits F18 (Star Key) on the computer keyboard.
  Pt. given insurance & database forms to complete.
  Box A-BLUE.

No
  See detail breakout

Are completed forms returned to receptionist?

Yes
  Billing Office/Insurance Forms
  Stamp w/ reg. card consult packet (BARF form, blue database sheet, RAD, RT checklist). Write initials of attending MD & date only on RAD. Carry packet & outside information such as slides & films to clinic desk.

No
  See detail breakout

Is pt. non-HMO? 2-C-BLUE

Yes
  Receptionist calls billing office, gives pt. name & phone #, tells them pt. refused to complete insurance form.

No
  See detail breakout

Does pt. have a valid registration card? 2-B-BLUE

Yes
  Receptionist hits the find key on the computer keyboard.

No
  See detail breakout
IS BARRF Form complete? 2-A-A-BLUE

no

Clerk check consultation form to see if appt. is correct.

Check HIS to see if pt is scheduled in another clinic.

yes

Is pt. appt. written on BARRF form?

no

Page resident.

Send pt. to other clinic.

yes

Ask the resident if we should add pt. to clinic schedule.

Type pt. appt. in computer.

Pt. given insurance & data form to complete.
Patient Consult Master Flow Chart

Does pt. have a valid registration card?
- no
  - Is the pt. registered on HIS?
    - yes
      - Receptionist gets registration # off of computer.
      - Receptionist enters registration # into AO scheduling system.
      - Receptionist enters registration # into Rad. Oncology scheduling system.
    - no
      - Receptionist gets pt. registration number off of computer.
  - no
    - Is the pt. ambulatory?
      - yes
        - Receptionist sends pt. to Taubman to register.
      - no
        - Register pt. over the phone.

Stamp w/ reg. card, consult packet (BRRF form, blue database sheet, PRD, RT checklist). Write initials of attending MD & date on BRRF form & date only on PRD. Carry packet & outside information such as slides & films to clinic desk.
Radiation Oncology Reception Do/Is
pt. non-HMO?

Yes

Call billing office to
warn them of HMO need
for referral.

Is RT chart
on clerk’s
desk?

Ife RT chart
on door to
exam rm?

Give resident
HMO
notification
sheet to put on
RT chart.

No

Reception clerk checks
for signatures on
forms.

HMO notification sheet
put on RT chart; Nurse
Side tells Dr. about
sheet.

Clinic Desk
Desk

Clinic Desk 3-PINK

Is Pt. referred from inside UM?

- no
  - Copy all referring documents, put original in RT chart, copies on hospital chart.
  - Does pt have slides?
    - yes
      - Copy slide report & send w/slides to pathology.
    - no
      - Call med records or unit w/chart or look on HIS for location of chart before pt arrives.

- yes
  - Is hospital chart at clerk's desk?
    - no
      - Call med records or unit w/chart or look on HIS for location of chart before pt arrives.
    - yes
      - Call that unit.

  - Is it known where chart is located?
    - no
      - Call trouble clerk in Medical Records.
    - yes
      - Is chart needed before pt can be seen?
        - no
          - Assemble RT shadow chart; HMO notification, dictation from other MD's, pathology & face sheet. 3-A-PINK
        - yes
          - Send transporter for chart.
Assemble RT shadow chart; HMO notification, dictation from other MD's, pathology, face sheet.

3-A-PINK

Copy face sheet for database.

Do we have the pt.'s X-ray jacket?

Are the films from within UM?

Does the pt. have outside films?

Call Radiology for X-ray.

Complete outside film card & put green sticker on film jacket.

Does Radiology know where films are?

Are X-rays needed before pt. can be seen?

Send transporter for X-rays.

Nurse Aide puts pt. in exam room.

Lost
Is pt. a candidate for treatment? 4-R-GREEN

- Non-emergent treatment?
  - yes
    - Physician gets consent form signed/nurse talks to pt.
    - Slide tape reviewed if time allows or nurse reviews simulation preparation & tx. info, as well as RT tx. routines.
    - Schedule checked.
    - Pt. simulated & treated.
    - Pt./family routed to reception desk for parking sticker.
  - no
    - Contact chief therapist for same day scheduling.

- Is pt. protocol?
  - yes
    - Pt. is seen by nursing
      - nurse introduces self & explains role to pt./family
      - nurse glues pt./family their business card
      - nursing may assess the child's cooperativeness & need for sedation.

- Is pt. adult?
  - no
    - Stop at clinic desk to drop off paperwork.
  - yes
    - Pt. leaves department with paperwork.

Pt. leaves department.

Schedule appointments. (see S-YELLOW)
Enter pt. location: OP or floor #. 4-C-Yellow.

Is pt. new to treatment at UM?

Enter ports as 02.

Enter area (found on BARRF).

Are there special notes?

Enter area (OP or floor #).

Does pt. need CT?

Go to box 20.

Will pt. be IP or sedated?

Check computer for CT availability on day after sim.

Is CT slot available?

Enter pt. name.

Choose "CT".

Enter time.

Enter length as 60 minutes.

Enter Dr.'s initials.

Enter location (OP or floor #).

Enter area.

Cell Matt CT. Schedule CT no sooner than day after sim & not on Tues, Thurs or Fri between 7 am & 11 am.

Continued on next page.
Check computer for sim availability at least 3 working days (excluding Fri) after CT (or sim if no CT is scheduled) when Dr. is in clinic.

Is sim available?

yes

Enter pt.'s name

Choose Sim I or Sim II

Enter time

no

Check computer for sim availability at least 3 working days (excluding Fri) after CT (or sim if no CT is scheduled) when Dr. is in clinic.

Is sim available?

yes

Enter pt.'s name

Choose Sim I or Sim II

Enter time

no

Call Mod CT.
Schedule CT no sooner than day after sim & no on Tues, Thurs or Fri between 7 am & 11 am

Is area other than prostate?

yes

Enter length as 60 minutes

no

Enter length as 90 minutes

Enter Dr. initials

Enter pt. location (OP or floor #)

Enter ports as 04

Enter area

Are there special notes?

yes

Enter special notes

Continued from previous page

Enter length as 90 minutes

no

Go to Box 30
scheduler's initials

Enter scheduler's initials

Schedule start

Contact chief therapist for scheduling

Is satisfactory start date available?

Enter pt. name

Choose machine "6", "18" or "1800" (found on BARRF)

Enter time

Are ports 3 or fewer?

Enter length as 60 minutes

Enter length as 30 minutes

Enter Dr.'s initials

Enter location (OP or floor #)

Enter ports (found on BARRF)

Enter area

Are there special notes?

Enter special notes

Enter scheduler's initials

Write appointments on BARRF

Notify pt. of appointments & write appt. cord

Pt. leaves the department
Appendix C: Data Collection Forms
This information form is part of a combined effort between the Department of Radiation Oncology and the Management Systems Department of the UM Hospital to enhance the patient flow. This will be accomplished through decreasing patient wait time(s) and improving the overall department structure. The information you present on this form is in no way related to your name. Accurate information is greatly appreciated.

**Date:**

**Diagnosis:**

**Physician:**

**Type of Visit:**

- [ ] Consult
- [ ] Follow-Up

**Appointment Time:**

**Exam Room Number:**

**Arrival Time:**

**Time Enter Exam Room:**

---

### TO BE FILLED-OUT BY PATIENT

#### Check All Providers Involved In Encounter

**Encounter 1**

- [ ] Staff Physician
- [ ] Resident Physician
- [ ] Nurse
- [ ] Nurse Aide

<table>
<thead>
<tr>
<th>Provider Type</th>
<th>Time In</th>
<th>Time Out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Encounter 2**

- [ ] Staff Physician
- [ ] Resident Physician
- [ ] Nurse
- [ ] Nurse Aide

<table>
<thead>
<tr>
<th>Provider Type</th>
<th>Time In</th>
<th>Time Out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Encounter 3**

- [ ] Staff Physician
- [ ] Resident Physician
- [ ] Nurse
- [ ] Nurse Aide

<table>
<thead>
<tr>
<th>Provider Type</th>
<th>Time In</th>
<th>Time Out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Encounter 4**

- [ ] Staff Physician
- [ ] Resident Physician
- [ ] Nurse
- [ ] Nurse Aide

<table>
<thead>
<tr>
<th>Provider Type</th>
<th>Time In</th>
<th>Time Out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check Out Time:**

---

Please write any comments you may have on the back of this form.

Also, please return this form to the Check-Out Desk before Leaving.

Thank you for your assistance!
On-Treatment Visit Information Form  
Department of Radiation Oncology

This information form is part of a combined effort between the Department of Radiation Oncology and the Management Systems Department of the UM Hospital to enhance the patient flow. This will be accomplished through decreasing patient wait time(s) and improving the overall department structure. The information you present on this form is in no way related to your name. Accurate information is greatly appreciated.

Date: ________________    Physician: ________________

Diagnosis: ________________

Appointment Time: ________________    Arrival Time: ________________

Exam Room Number: ________________    Time Enter Exam Room: ________________

TO BE FILLED-OUT BY PATIENT

Check All Providers Involved In Encounter

<table>
<thead>
<tr>
<th>Encounter</th>
<th>Provider Type</th>
<th>Time In</th>
<th>Time Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Staff Physician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Resident Physician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Nurse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Nurse Aide</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Encounter</th>
<th>Provider Type</th>
<th>Time In</th>
<th>Time Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Staff Physician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Resident Physician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Nurse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Nurse Aide</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Encounter</th>
<th>Provider Type</th>
<th>Time In</th>
<th>Time Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Staff Physician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Resident Physician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Nurse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Nurse Aide</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Time Patient Leaves Exam Room: ________________

Check Out Time: ________________

Please return this form to the Check-Out Desk before Leaving. Please additonal comments on back of sheet. Thank you for your assistance and have a nice day!
Simulation Information Form  
Department of Radiation Oncology

This information form is part of a combined effort between the Department of Radiation Oncology and the Management Systems Department of the UM Hospital to enhance the patient flow. This will be accomplished through decreasing patient wait time(s) and improving the overall department structure. The information you present on this form is in no way related to your name. Accurate information is greatly appreciated.

<table>
<thead>
<tr>
<th>Date:</th>
<th>Physician:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appointment Time:</th>
<th>Exam Room Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Arrival Time:</th>
<th>Time Enter Exam Room:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TO BE FILLED-OUT BY PATIENT**

**Check All Providers Involved In Encounter**

- **Did you see the Radiation Oncology Slide Tape:**  
  - If yes:  
    - Time Began:   
    - Time Ended:  

- **Was there further education after viewing slide tape:**  
  - If yes, who conducted:  
    - Staff Physician  
    - Nurse  
    - Resident Physician  
    - Nurse Aide  
  - Time Began:   
  - Time Ended:  

- **Did you sign a Patient Consent Form:**  
  - If yes, who was present:  
    - Staff Physician  
    - Nurse  
    - Resident Physician  
    - Nurse Aide  
  - Time Signed:  

- **Simulation:**  
  - Time Began:   
  - Time Ended:  

Please give any additional Comments:

[Additional Comments]

Check Out Time:  

Please return this form to the Check-Out Desk before Leaving.

Thank you for your assistance!
Unscheduled Clinic Visit Information Form  
Department of Radiation Oncology

This information form is part of a combined effort between the Department of Radiation Oncology and the Management Systems Department of the UM Hospital to enhance the patient flow. This will be accomplished through decreasing patient wait time(s) and improving the overall department structure. The information you present on this form is in no way related to your name. Accurate information is greatly appreciated.

<table>
<thead>
<tr>
<th>Date:</th>
<th>Physician:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Diagnosis:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Arrival Time:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Nature of Visit:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Exam Room Number:</th>
<th>Time Enter Exam Room:</th>
</tr>
</thead>
</table>

Who placed patient in room:
- [ ] Staff Physician  
- [ ] Nurse  
- [ ] Resident Physician  
- [ ] Nurse Aide

Physician who saw patient: 

Nurse Only Visit: 

<table>
<thead>
<tr>
<th>Time Physician Enter:</th>
<th>Time Physician Leave:</th>
</tr>
</thead>
</table>

Comments: 

<table>
<thead>
<tr>
<th>Remarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>----------</td>
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</table>

Check Out Time: 

Please return this form to the Check-Out Desk before Leaving. Thank you for your assistance!
Appendix D: Memorandum to DRO Patients
February 23, 1994

TO: Radiation Oncology Patients

FROM: University of Michigan Hospital
Department of Radiation Oncology
Management Systems Department

SUBJECT: Study of patient flow within the Department of Radiation Oncology.

The Department of Radiation Oncology is committed to Total Quality Health Care. We continually look for ways to improve our service. With the assistance of the Hospital Management Systems Department we are studying this area.

The purpose of this memo is to ask you to assist us in finding ways to improve your care. If you are here for a consult or follow-up visit, an on-treatment visit, and/or a simulation visit, you will be given an information form pertaining to your treatment and asked to complete the "TO BE FILLED OUT BY PATIENT" section. Your name is not recorded in this study, and the information that you provide will in no way be tied to your identity. In order to best serve your needs, we ask that you be honest in your comments, and try to give complete and accurate information concerning the service you receive.

Thank you for your time,

Department of Radiation Oncology
Management Systems Department
Appendix E: Questionnaire
Department of Radiation Oncology
Department Analysis

Graphics from Presentation

19 April 1994
Management Systems
Chad Cleveringa
Chad Dejong
Chris Cannon
Purpose of Clinic Analysis

- Improve overall efficiency of clinic through:
  - Improved scheduling practices
  - Improved clinic care decisions
- Increase quality of patient care
Clinic Analysis Approach

- Analysis of Clinic Flow Diagram
  - Interviewed Clinic Patients
  - Clinic Staff
- Data Collection Forms
  - Patients Filled Out
- Questionnaire
- Clinic Flow Simulation Model
Description of Current System

- Scheduling for 4 types of Visits
  - Consult
  - Follow-Up
  - On-Treatment
  - Simulation

- Eight Exam Rooms
- Equally Supplied
- One Room Typically Reserved for Unscheduled Visits

- Social Work Room
Description of Current System - cont.

- Physician meeting every morning
- Patient Flow communication by paper
- One Physician in Clinic on Friday
Finding 1

• Present Scheduling System Inefficient
  - Physicians scheduled to be in more than one place at a time
  - Clinic visits take significantly longer than scheduled
  - Consult Visit in particular
  - Inefficient utilization of Exam Rooms
1st Physician Encounter until Leave vs. Current Scheduled Time

Type of Visit

Consult

Follow Up

On Treatment

Average Time per Patient

(30, 36, 30, 19, 15)
Recommendation 1

- Compartmentalize schedule
  - Consults and Follow-Ups same day
  - On-Treatment and Follow-Ups same day
- Schedule by “shortest service time first”
- Increase allotted time for consult visits
  - From one hour to one and a half hour

Quality
Finding 2

Staff Physician Howard Sandler

- Most efficient in clinic
- Saw highest number of patients
- Time spent with patient follows departmental average
- Compartmentalizes schedule
- Uses time management tools
Recommendation 2

- Compartmentalize schedule
- Use time management tools
Finding 3

- Staff Physician/Resident Physician vs. One Physician
  - Service time for One Physician faster
  - Wait time in lobby higher for One Physician
Comparison of 3 Times with RP/SP vs. SP only -
Follow Up Visit

NOTES:
Patients spend approximately the same amount of time waiting to enter exam room and waiting in exam room as they do seeing the physician.
Staff physicians should see the patient by themselves if the patient has been waiting for an excessive amount of time
Comparison of 3 Times with RP/SP vs. SP only vs. RP only - On Treatment Visit

NOTES:
Treatment times are lower when staff or resident physician work alone
Staff and resident physicians currently only work alone if patient has been waiting in lobby for long time
Recommendation 3

- Follow-Up Visit
  - Staff Physician see patient during busy times
- On-Treatment Visit
  - Either Staff or Resident Physician see patient during busy times
- Make decision early as possible
Finding 4

• Physician Conference every morning between 7:30 and 8:30
• Patient Scheduling begins at 8:30
• Pre-visit Activities
  • Dosimetry
  • Simulation
  • Radiation Treatment Rooms
• Conference rarely finishes on time
  • Causes patient wait for extended periods of time
  • Wait perpetuates throughout day
8:30 A.M. Appointments

Arrival pattern

Time Till First Physician Encounter

0:06

0:38
Recommendation 4

• Alternative 1:
  • Begin scheduling patients at 9:15 AM

• Alternative 2
  • Tighten Conference schedule

• Alternative 3:
  • Physician forego Conference on days in clinic
Finding 5

- Schedules created every 3 months
  - Creates inefficient coordination between Physicians and clinic
- Physicians can cancel appointment times easily, with very little notice
  - Creates extra costs to notify and reschedule patients
Recommendation 5

- Develop clinic schedule every one to two months
- Physicians should use discretion in cancelling clinic
Finding 6

- Physicians in lab most (clinic least), have longest patient wait times
  - Physicians TL and ER
Consult Visit

- **Total Time In System**
- **Arrival until Leave System**

<table>
<thead>
<tr>
<th>Physician Name</th>
<th>Total Time In System</th>
<th>Arrival until Leave System</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE</td>
<td>115</td>
<td>117</td>
</tr>
<tr>
<td>AL</td>
<td>101</td>
<td>101</td>
</tr>
<tr>
<td>DT</td>
<td>112</td>
<td>112</td>
</tr>
<tr>
<td>ER</td>
<td>159</td>
<td>166</td>
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<tr>
<td>TL</td>
<td>169</td>
<td>177</td>
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<td>HS</td>
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<td>122</td>
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<tr>
<td>JR</td>
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<td>121</td>
</tr>
<tr>
<td>LP</td>
<td>132</td>
<td>140</td>
</tr>
</tbody>
</table>
Recommendation 6

- Smooth schedules to reflect extra time
- See patients with shortest service time first
- See Follow-Up and On-Treatment visits before Consult visits
Finding 7

- Wednesday and Thursday over scheduled
- One Physician scheduled in clinic on Friday
  - Under utilization of clinic
## Expected Room Requirements for Changes in Number of Visits Using April Schedule

<table>
<thead>
<tr>
<th>Room Requirement Time (1)</th>
<th>Actual Available Room Time (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>45.78</td>
</tr>
<tr>
<td>Tuesday</td>
<td>49.35</td>
</tr>
<tr>
<td>Wednesday</td>
<td>61.13</td>
</tr>
<tr>
<td>Thursday</td>
<td>63.92</td>
</tr>
<tr>
<td>Friday</td>
<td>10.50</td>
</tr>
<tr>
<td>Monday</td>
<td>51.18</td>
</tr>
<tr>
<td>Tuesday</td>
<td>54.75</td>
</tr>
<tr>
<td>Wednesday</td>
<td>66.53</td>
</tr>
<tr>
<td>Thursday</td>
<td>69.32</td>
</tr>
<tr>
<td>Friday</td>
<td>10.50</td>
</tr>
</tbody>
</table>
Recommendation 7

- Physician from Wednesday or Thursday mornings
  - Place on Friday morning
  - Or adjust work schedule of staff

- Smooth schedule
  - Example: Switch two of AE’s Follow-Ups from Wednesday to Monday
Finding 8

- Notification of patient arrival by Nurses through paper in Physician work room
- Notification of patient arrival sometimes late
  - Physicians not informed of patient arrival
- Computer system available
  - Not currently used
  - Programmer on staff
Recommendation 8

- Use existing computer system
  - Eliminate “paper” method
- Place computer terminals in areas and rooms where necessary
- Nurses or Nurse Aides use terminal to update patient information
- Physicians use computer terminal
- Administrative purposes
- Flag System on exam room doors

Quality
Finding 9

- Charts and X-Rays not always present when patients arrive
- Significant problem
Recommendation 9

- Designate specific responsibility to staff member to:
  - Obtain Charts and X-Rays
  - Ensure their arrival
  - Collect all materials and prepare for Physician
    - Little pre-visit paperwork to complete

- Begin search and gathering day before patient visit
  - check into system used in Hospital