Managing Transplant Decisions at University Medical Center Leuven:

Physician Behavior (A)
On 21 January 2002, Luc, Chief of Transplant Surgery, sent a strongly-worded letter to Jan, Chief Executive Officer of the 1,782-bed University Medical Center in Leuven, Belgium (UMCL). The letter (see Exhibit 1) expressed “grave concern and worry” about the future of the high profile, lucrative and internationally acclaimed program in transplant surgery due to a capacity problem in their massive 136-bed intensive care unit. On 11 January 2002, a transplant operation had almost been postponed because all the intensive care beds had been fully occupied. Had it been postponed the patient could have died.

Even more damning was the accusation that “an identical scenario repeated itself only one week later, on Wednesday 17 January, when another patient who had been on the waiting list for a very long time for a combined liver-kidney transplant” was almost denied a transplant. The Chief of Transplant Surgery explained that in both instances there had been no other transplant activities. On this evidence alone, he argued, it was clear that intensive care bed capacity had to be increased.1

Noting the date on the letter, the CEO quickly forwarded it to the Clinical Director (Peter, M.D., Ph.D.) who had been on-call on 17 January and was most familiar with the situation. A few hours later, Peter read the letter, tracing the bizarre sequence that led to a decision to refuse a donor liver and to that transplant patient almost losing his life. He also recalled the events of 17 and 18 January, remembering how much energy and time had been wasted and how he had first learned of the transplant problem that afternoon.2

Some Confusion over a Transplant Decision

On Wednesday afternoon, Peter, one of three Clinical Directors at UMCL, was about to check both his voice-mail and e-mail. In addition to his regular responsibilities, that week he was in charge of the first major symposium between two Belgian hospitals and his mind was occupied with his role as host. Nearly 400 clinical leaders, hospital managers, and health policymakers were expected to attend. He had been busy since 8 a.m. with usual hospital issues, and dropped into his office around 4 p.m. to check his e-mail, prepare for a few meetings and an early dinner with the CEO and the other clinical directors.

At 4.03 p.m., he had begun to check his e-mail when he noticed two that were marked urgent. One was from Helmut, Coordinator of the Operating Room; the second was from Bart, Chief of the Surgical Intensive Care Unit (SICU). He knew immediately that trouble was brewing because he was on-call3.

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1 The allocation of intensive care beds can be found in Exhibit 2.
2 See Exhibit 3 for a list of the physicians involved with this case.
3 On-call means that an M.D. from the ‘top management team’ would be available to sort out hospital emergencies or inter-departmental coordination problems. The hospital had developed a new system in which the CEO, the Chief Medical Director, and the three Clinical Directors would each take a week to be ‘on call’ so there would always be a medical member of top management available 24-hours a day.
Peter instinctively began thinking about the hospital’s chronic bed capacity problem and what happened when the beds were full: patients and caregivers can get into fights.

Although there were 136 intensive and medium-care beds, they were nearly always 100% occupied for a variety of reasons. For example, following a fire in a Dutch nightclub on New Year’s Eve which severely burned 65 people, nearly half of the victims were diverted to German and Belgian hospitals since the Dutch healthcare system has a limited burns capacity. UMCL admitted five of the most severely burned patients to the SICU, thus reducing the number of beds available for cardiac and other elective surgery patients during the months of January and February. Peter began to think about the computerized surgery scheduling system and how that system brought a new discipline to surgical services.4

He decided to telephone (rather than e-mail) Helmut, Coordinator of the Operating Theatres.5 When Helmut picked up the phone he sounded very concerned:

"Karel6 wants to do a transplant tonight but we have no capacity to do it. The organs are not harvested yet but, first, there are no SICU beds, and, second, Luc, the Chief of Transplant Surgery, is in another hospital at a meeting today. The transplant surgeon who is second-in-charge believes that this patient is not a good indication for the surgery,7 so we should not be doing such a procedure on this patient. You know a combined liver and kidney transplant is a 10-12 hour procedure. Well, it’s not up to me to make the decision. If we go ahead, I will have to cancel half of the elective abdominal surgeries planned for tomorrow because our people will have to work through the night and into tomorrow morning."

Peter had learned from experience that it was better not to “react” immediately over the phone but to promise to call back, which he did. Even in an emergency there is usually five minutes to think about the situation and, if necessary, get more information. Now he needed to diagnose the situation, separating the facts from the assumptions. He also needed to make sure everyone was clear about the hospital’s objectives. Since Bart, Chief of the SICU, had left an urgent e-mail, calling him next was an opportunity to obtain more information about this transplant situation.

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4 See Exhibit 4 for a summary of the surgery scheduling system.
5 Helmut, MD/Ph.D., the Coordinator of the Operating Room (OR), is also an anaesthesiologist. His chief responsibilities include keeping the communication channel open between the SICU, transplant surgeon, and the OR staff as well as organizing the OR schedule for surgeons and OR staff.
6 Karel, MD/Ph.D., is the hepatologist and Chair of Internal Medicine. Furthermore, he is a former Dean of the Faculty and member of the medical board.
7 Each patient is evaluated and a good indication means that there is likely to be a good outcome.
At 4.20 p.m. Peter called Bart, who explained:

"We do not have enough SICU beds. We have bottlenecks all the time. Just look at the data on the growth of transplants here. We have developed medical possibilities that never before existed, but we are hitting logistical and resource constraints that make these services inaccessible to patients. Because of scientific and technological progress, 80-year-olds can receive a new heart which means they can live for many more years. The consequences of this evolution for healthcare in Belgium are hardly understood."

Bart gave Peter a list of four patients who were not getting the quality care needed because they were waiting in the Emergency Room for a SICU vacancy. One oncology patient, for example, a young father with two children, desperately needed a SICU bed.

Peter quickly determined that there were three facts that supported a decision not to schedule the combined liver-kidney transplant for tonight. He told Bart:

"First, the transplant surgeon who examined the patient believes that the indications are not very good for the patient. Second, we appear to have four other patients who should have higher priority and who have been waiting for a SICU bed. Third, there are no SICU beds available, so the patient will not get adequate nursing care during the critical hours following the transplant procedure."

"Don’t worry, Peter, this issue is under control," said the Chief of SICU. "I distinctly told Karel an hour ago that he could not go ahead. I explained that other patients had higher priority. He wasn’t happy but I think he understands."

Peter thought about how patient care decisions like this were made in a university hospital. Although it seemed like a simple clinical decision, if physicians’ interests were in conflict with management, through pressure and bullying “yes” decisions could become “no” decisions and vice-versa. In the SICU chief’s mind, this transplant was under control but Peter was not so sure.

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8 Bart, MD/Ph.D., is Chief of Intensive Care Unit (SICU). He is responsible for coordinating the flow of patients. He takes the lead when demand for the SICU exceeds capacity; he must analyze the situation and help to determine which patients, (emergency room, elective surgery, transplant, urgent care, and so on) should have priority.

9 See Exhibit 5 for the growth in the transplant program.

10 See Exhibit 6 for a summary of the surgical intensive care unit and an understanding of the patient’s experience.
The University Medical Center at Leuven\textsuperscript{11}

UMCL is an academic medical center connected with a large university and medical school. The university was founded in 1425. The hospital and medical center are one legal entity. In 2000, the medical center had 555,458 ambulatory visits, 52,239 ER visits, and 12,888 ambulatory surgeries. The hospital had 64,520 discharges and an average length-of-stay of 8.5 days. The hospital employed 7,000 people (4,381 FTE employees) and earned $450,000,000 (US dollars) in total revenues.

The medical center has an excellent reputation throughout Europe. It is considered by experts to be a high performing delivery system (in terms of quality and productive efficiency). A recently published report placed it fifth among the top medical centers of Europe on the basis of its research reputation (publications and impact).

UMCL has four physical plant sites: Gasthuisberg, Saint Raphael, Pellenberg and Lubbeek. The main site is Gasthuisberg which has 1,352 beds and most of the acute care services. Saint Raphael, which is located in Leuven City Center, has 100 beds and houses some outpatient clinics and the geriatrics and psychiatry services. Pellenberg has orthopedics and rehabilitation and 330 beds. Finally, Lubbeek is an outpatient and day surgery facility.

There are 500 certified physicians and 500 residents on staff. All physicians are salaried employees.\textsuperscript{12} The medical staff at UMCL has a very strong commitment to the institution and its survival. For them, patient care is not just medical work, it is a mission for the care providers at UMCL.

Wednesday Afternoon, 17 January: The Confusion Continues

As promised, Peter called Helmut and explained that he had discussed the case with Bart. Together they had decided that the transplant was not going to happen. Indeed, Bart had assured him that Karel knew that transplant was off.

Peter said:

"Do not worry. The transplant is off. However, call the transplant coordinator to be sure everyone knows about the decision and there are no mis-communications."

At 4.28 p.m., 25 minutes had elapsed between the three phone calls and Peter sat back and thought about the stakeholders and their interests. If Bart was right, then the transplant was off. Nevertheless chiefs are powerful individuals. He

\textsuperscript{11} For a partial organization chart of the key people, see Exhibit 7.

\textsuperscript{12} While some physicians, such as pediatricians are 100% salaried, others received incentive compensation. For example, in addition to salary, cardiac and plastic surgeons receive a small (5-10\%) performance-related incentive compensation.
thought about worst-case scenarios—Karel might ignore Bart’s directive, involve the Chief Medical Doctor, the CEO, the Dean, Chancellor or even the press.

If Karel wanted to overturn the decision, he needed to make a few phone calls. Peter decided to call Marcel, the Chief Medical Doctor who was on-call that week, to explain the situation and the rationale for postponing the transplant:

“Hello Marcel. I just wanted to alert you that you may be getting a phone call from Karel about a decision to postpone his patient’s transplant. Let me explain why Bart is convinced that the transplant cannot be scheduled for tonight. First, the transplant surgeon who examined the patient believes that the indications are not very good for the patient. Second, the SICU is 100% occupied and we appear to have four other patients who should have higher priority that are waiting for a SICU bed. Third, if the transplant surgery is performed and no SICU bed is available, the patient will not get adequate nursing care during the critical hours following the transplant procedure.

“If we had five empty SICU beds, we would not be having this discussion. But the SICU is 100% occupied - when the bucket is full, no one can add an additional litre.”

When Peter finished speaking, the Chief Medical Doctor was silent. Sensing that Marcel was uncomfortable with the decision to halt a transplant, Peter added, “I called you because I expect that you will get a phone call. Now you know how the issue will affect the hospital and the other patients.”

As he hung up, Peter concluded that though uncomfortable, Marcel would support the decision not to go ahead.

**Peter Cancels a Meeting with the CEO at the Restaurant**

At 7 p.m., Peter had planned to meet with the CEO and the other clinical directors at a restaurant to discuss hospital issues that had arisen. On the way, he received a call from his wife that Karel had called. He tried to call him back but without success. The car phone rang again and his wife explained that Helmut had also called:

“Helmut is at home, Peter, and he has been called by the anaesthesia night-shift because the name of the liver-kidney transplant patient has re-appeared on the OR blackboard. But that is not all. A second liver transplant has also been scheduled for tonight!”

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13 Marcel is respected by most clinicians as a prominent academic and scientific researcher at UMCL.
Peter was stunned. A second transplant was inconceivable Peter called the CEO to explain what had happened and was excused from the meeting. While driving back to the hospital, he called Marcel and Bart to inform them that two transplants had been scheduled. Marcel offered to make some phone calls and Bart agreed to meet Peter on arrival.

**Wednesday Evening and the Day has not Ended**

Just before Peter arrived at the hospital, he spoke with Helmut, Director of the OR, who said:

“I heard about what happened. Bart called me and explained the situation. It is your decision, Peter! But let me tell you one thing: in that part of the Operating Room, abdominal surgery and abdominal transplant surgery share space. If they perform the transplant tonight, we can’t keep the nurses on tomorrow. If they work tonight they have to go home. So if this transplant goes ahead, we will have to cancel half of the elective abdominal surgeries tomorrow! The surgeons will eat me alive for allowing this to happen.”

No sooner had Peter hung up than Marcel called back:

“I spoke to Luc and Karel. The transplant surgeon is at the hospital; he wants to go ahead but claims to know nothing about the second transplant. Karel promised us two empty beds in medical intensive care (MICU). He is the chief of internal medicine and will be able to free up the beds. Look, Peter, it is far too late to stop this, they have already started harvesting the donor organs in another center in Belgium. I asked them who put the patient’s name on the blackboard and they claim that they know nothing.”

Peter agreed, but he also knew it was his responsibility to find out exactly what had happened:

“I was afraid that the transplant might go ahead. Somehow we did not explain the situation very well nor did we communicate a clear decision. But who gave them permission to go ahead? And who put the patient’s name on the backboard? I am on my way to the hospital. I need more information. I think at a minimum we need to talk to Luc\(^{14}\) and see the patient together. I think Luc has not even seen the patient, so there is still a chance the surgeon may reject the case.”

Peter arrived at the medical center at 10 p.m. and went to the SICU where Bart explained what had happened earlier. He finally understood why there was so much miscommunication.

\(^{14}\) The Chair of Transplant Surgery who is performing the procedure.
Flashback to the Earlier Meeting

Peter discovered that earlier that day Bart had met with Karel. Their discussion focused on the current capacity of the SICU and the problem that this posed for a transplant. Throughout the meeting both had been very courteous. However, once each one had taken an opposing position on the issue, an irreconcilable conflict had surfaced. Their voices and the tone of the discussion began to attract the attention of the nurses. Karel, sure he was right, stated his position both dramatically and eloquently:

"Bart, how can you make a decision like this? I would never make a decision like this. My patient's life is at stake! This poor man needs a liver transplant tonight or he could die. Answer this question: When will another liver-kidney be available? Do you want to talk to his family? This patient has been placed in a high prioritization category by Euro Transplant. He is type O, not AB, and type O patients have the longest waits. Type O are the least likely to have an organ opportunity in the next 48 hours. I tell you, Bart, there is a 90% chance he will die before another donor organ becomes available.

"Look, Bart, my patient urgently needs this life-saving treatment. He has advanced to the top of the list in Europe! Can you, as Chief of SICU, in good conscience prevent this transplant today? Time is of the essence. We can always hire more physicians but we can't always find the organs."

Bart explained to Peter that he listened not to refute Karel but to better understand the situation. Bart had said to the hepatologist:

"I am truly sorry. If we had SICU beds you know I would support you. But today our beds are full and other patients have higher priority. It is always an impossible situation when the beds are full. For example, we have four patients in the emergency department who have been waiting days for an intensive care bed."

Bart went on to explain that the hepatologist had responded saying:

"I do not want to pull rank, but I am the Chief of Internal Medicine. What if I go to my Medical Intensive Care Unit (MICU) and see if I can free-up two beds for you for tomorrow, OK? So we can go ahead tonight."

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15 Eurotransplant, the official association serving transplant centers in Austria, Belgium, Germany, Luxemburg, the Netherlands and Slovenia, determines the allocation rules. It is equipped with the latest computer algorithm that emphasizes objective clinical health markers.

16 Blood type affects the compatibility of organs. In addition to their match, patients with type A & B blood can use type O, but not vice versa. Type O can only receive a liver from type O and AB can receive a liver from any blood type.
Bart had replied:

“No, I am afraid that won’t work. The MICU lacks experience with immediate post-transplantation care. This will not be good for the patient. That aside, it does not solve the problem of the four medical patients in the Emergency Room waiting for a SICU bed. If you can free up two beds, two of those four patients should have priority. But let me ask you this question: If you can free up two beds, why didn’t this happen sooner? What kind of decision-making process is this?

“Then Karel said to me, ‘You know the way things work in a hospital.’ I told him, ‘I do, but we are trying to be more rational at this medical center. I am truly sorry, Karel. I have exhausted all possibilities. This transplant just cannot be done today.’”

After giving his account, Bart added:

“Peter, after that meeting I spoke with you and said what I truly believed: ‘The issue is under control.’ Little did I know what Karel was about to do next. Here is the part of the story that neither of us knew about this afternoon. When Karel left the SICU, he put on his Chief of Internal Medicine hat and raced over to the MICU. He saw Christophe, the physician in charge of the MICU and ordered: “I have an urgent transplant. Christophe, I want you to free up two beds. And please do it before noon tomorrow.”

Christophe had replied:

“I understand the urgency of the situation, Professor, but this may be very difficult to pull off. Take a look. We have many sick and frail patients in here. We have people on respirators and life supports. Besides, there are several patients in the emergency room waiting to come in here too. But I will see what I can do, Professor.”

A Final Attempt

Once Peter understood what Karel had done, he and Bart met with Luc\(^\text{17}\) to understand why the transplant was going ahead despite the poor clinical indications. Luc claimed that he had examined the patient and felt that the patient was fit for surgery. Bart spoke abruptly:

“Luc, this patient will not get adequate intensive care. Are you sure you want to go ahead? I do not buy that there are two beds in MICU. We have four patients waiting for those beds in ER. After you perform this transplant, the poor patient will have to stay in the OR maybe all day. He will not receive the best quality care that we have to offer.”

\(^{17}\) The chief of transplant surgery.
Luc said: “I am sure there is much to discuss but the time for discussion is over. They have already harvested the organs!"

Bart said: “We could always send the patient together with the organs to another transplant center that has excess capacity tonight.”

Luc quickly responded to Bart: “You know that is not a viable option any more.”

Peter felt that while it appeared that Luc was not putting the patient’s safety first, he must be missing some important facts. Perhaps Luc didn’t want to lose this “transplant activity” to a competing transplant center because he felt the patient would be better off at UMCL. Peter knew that the Chief of Transplant Surgery was very sensible and cared about quality. So how did this situation happen? What really went wrong? He thought about the growth of the transplant program over the last few years and how successful it had become.18

Later that evening, after Bart and Peter had gone home, Bart called Peter at home to thank him for listening to the issues and for his courageous involvement:

“We made the right clinical decision but we lost, but not because of anything we did not do. The absence of a planned decision led to a default decision. But at least we avoided this becoming a political decision.”

Peter reflected on the day and thought to himself:

“We have an opportunity tomorrow to understand what went wrong and to learn some lessons. To understand what happened we need to analyze what is working, what is not working, and what we can do about it. We need to understand where accountability should be, and whether or not we can agree on procedures or a protocol for making better decisions in the future. We need to think about capacity as well as roles, responsibilities, lines of authority, and process. If there are constraints, we need to fix them because this decision process needs improvement.”

18 See Exhibit 5 for a summary of the growth in the transplant program.
Exhibit 1
Letter

Dr. Jan Van E., CEO
January 21, 2002

Dear Colleague,

With this letter I want to inform you of my grave concern for and worry with regards to the future development of the liver transplant program, and request your urgent support.

On Thursday evening, January 11th, I received a first donor liver offer for a patient who was on a waiting list for more than 6 months, and who had deteriorated quickly. This liver was one of the last chances for this patient. Furthermore, since allocation of donor livers are patient-oriented, this means that this specific liver was allocated to this specific patient, and not to be used for another patient. Furthermore, the donor organ came from Antwerp, where they are trying to start up a new liver transplant program.

I was confronted with a capacity problem in ICU where there was no bed available, essential for post-operative care for this type of surgery. What am I to do as a medical doctor responsible for a patient who has an adequate donor liver available?

These are my options:

- Refuse the donor liver offer with, as a consequence, a very high risk of mortality during the waiting time for another organ. Furthermore, you can imagine the consequences of refusing a liver from the university hospital in Antwerp because of capacity problems in our center.
- Continue anyway and have the patient admitted to MICU, where experience with immediate post-transplantation care is absent.
- Send the patient with the allocated liver to another transplant center where they do have places available in ICU.

Finally we did go ahead with the transplant with, as a backup plan in case there would not be a place available in the SICU, the possibility to have the patient admitted to the MICU, which is a sub-optimal option but better than no transplant at all.

After the transplantation (Thursday night from 23h to 6h) the patient spent an additional five hours in the operation room before she could be admitted to SICU.
Exhibit 1 (Cont’d)

An identical scenario repeated itself one week later, on Wednesday, January 17th, with a patient who had been on the waiting list for a very long time for a combined liver-kidney transplant.

Also in this case a lot of energy and time was wasted for everyone. After the transplantation (Thursday night from 23h to 10h) this patient remained in the operation room for another five hours waiting for a bed in SICU.

It is important to notice that on not one of these days was there peak transplantation activity. In fact, there was no liver transplantation patient admitted at that moment so the quota of beds allocated in SICU to the liver transplant program (maximally 4 beds: 2 acute and 2 chronic) was not filled at all.

I understand that admitting liver transplants interferes with the admitting of other patients (elective surgery, critical patients with other pathology) and that this causes dilemmas for the treating physicians. In contrast to the non-transplant patients, however, a donor liver offer constitutes for some patients their only chance for treatment. Furthermore, there is already a shortage of organs, and it would be unacceptable to refuse an offer (that may not repeat itself again) because of a capacity in intensive care beds.

I see no other solution than an expansion in the capacity of SICU-beds (the liver transplant program is growing exponentially without any adjustment in capacity on SICU for this group of patients), a more flexible change of patients between MICU and SICU in case of emergency, and above all an absolute priority for transplants in view of the shortage of life-saving organs.

The liver transplant program is a typical academic program that is also financially lucrative (which, by the way, constitutes a stimulant for other centers to start such a program). Furthermore, the liver transplant program stimulates patient activity for other services: other surgeries, medical activities, and lab work for our hospital.

Despite the shortage of human resources and structural means, all members of this program have worked very hard to bring this program to a top international level. I therefore hope that urgent measures will be taken to protect the existence of our program. This comes at a strategic moment for our hospital because other medical centers are starting up new competing transplant programs.

I thank you for your attention and am always available to discuss this problem with you.

Yours sincerely,
Luc
Exhibit 2

Intensive Care Beds at UMCL

<table>
<thead>
<tr>
<th>Abbreviations used</th>
<th>Patient type</th>
<th>Head MD</th>
<th>Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>SICU</td>
<td>Intensive care unit</td>
<td>Mostly surgical</td>
<td>Bart</td>
</tr>
<tr>
<td>MICU</td>
<td>Medical intensive care unit</td>
<td>Non-surgical</td>
<td>Christophe</td>
</tr>
<tr>
<td>ER</td>
<td>Emergency room</td>
<td>Any new emergency</td>
<td></td>
</tr>
<tr>
<td>PACU</td>
<td>Post-anaesthesia care</td>
<td>After surgery</td>
<td>Helmut</td>
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<tr>
<td>CCU</td>
<td>Coronary care unit</td>
<td>Non-surgical cardiac</td>
<td></td>
</tr>
<tr>
<td>Medium Care</td>
<td></td>
<td>Mixed</td>
<td></td>
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<tr>
<td>TOTAL</td>
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Exhibit 3

Key People Involved

<table>
<thead>
<tr>
<th>Medical specialty</th>
<th>Function in the hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helmut</td>
<td>Anaesthesia OR coordinator</td>
</tr>
<tr>
<td>Bart</td>
<td>Anaesthesia Chair, SICU</td>
</tr>
<tr>
<td>Karel</td>
<td>Hepatology Chair, Dept. Hepatology Chair, Internal Medicine</td>
</tr>
<tr>
<td>Peter Janssen</td>
<td>Pathology Clinical Director</td>
</tr>
<tr>
<td>Marcel</td>
<td>Nephrology Chief Medical Doctor</td>
</tr>
<tr>
<td>Jan Van E.</td>
<td>Psychiatry CEO</td>
</tr>
<tr>
<td>Christophe</td>
<td>General internal medicine Staff, MICU</td>
</tr>
<tr>
<td>Herman</td>
<td>General internal medicine Chair, MICU</td>
</tr>
<tr>
<td>Karin</td>
<td>Cardiac surgery Chair, Dept. Cardiac Surgery Chair, Board of Transplantation</td>
</tr>
<tr>
<td>Ralf</td>
<td>Trauma surgery Chair, Dept. Traumatology Chief of Surgery</td>
</tr>
<tr>
<td>Luc</td>
<td>Transplant surgery Chair</td>
</tr>
<tr>
<td>Maria</td>
<td>Anaesthesia Chair</td>
</tr>
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</table>
Exhibit 4

Procedures for Scheduling Elective and Transplant Surgeries at Leuven Medical Center

In an academic medical center, the care process requires a very high degree of interdependence among nurses, physicians, operating rooms, intensive care beds, convalescent beds, and so on. Scheduling systems can help the medical center to plan and coordinate their patient care activities. However, not every patient care activity is predictable and the capacity is limited (See Exhibit 2).

In the past, surgery would be scheduled whenever an operating room was available. The physicians would forget to consider the availability of: the SICU, nursing wards, and the patient’s expected length-of-stay (LOS). Opportunistic scheduling worked fine when capacity was underutilized; however, when occupancy exceeded 95%, poor scheduling meant delaying and postponing surgery, rendering the SICU inaccessible, inconveniencing patients and caregivers. On those days, the surgeons and nurses left the hospital frustrated by long waits and postponements. Patients were sent home or back to their rooms and in some cases patients who had had surgery were not offered the appropriate quality of care they would have received if they had had access to the SICU.

To improve scheduling and the quality of care, the medical center developed a computer-based planning and bed allocation system to support admitting patients and scheduling operations. The computerized scheduling system takes into account key variables before admitting a patient. When confronted with a surgical request, the scheduling system finds a time and place based on a consideration of four factors:

1. The availability of a fully-staffed OR for the average expected duration of this particular operation;
2. The availability of the surgeon;
3. The expected average utilization of SICU care bed days;
4. The expected average-length-of-stay in a regular (non-SICU) hospital bed.

When a surgery is indicated, the surgeon enters two pieces of information: (1) the type of procedure, and (2) the preferred month to perform the surgery. The computer automatically schedules the date. The surgeons like computer-assisted scheduling because it reduces power imbalances, preferential treatment and favoritism, and uncertainty. They spend less time waiting for the OR and more time in value-adding activity. When patients are given a firm date they experience less inconvenience, better information and greater overall satisfaction. Hence, the computer-aided scheduling system improves the quality and efficiency of patient care.

Although 80-85% of the surgeries are elective and can be planned and scheduled in advance, as many as 15-20% of these surgeries are completely unpredictable. Some of these unexpected surgeries are simple maternity cases or coronary artery by-pass grafts, or are the more serious urgent and emergency care cases.

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19 Increased demand came as a result of major reorganization in response to financial losses.
20 This program is based on Goldratt’s theory of constraints (1989).
In the event of a transplant surgery, there is a sudden and unpredictable demand for the operating room, anesthesiology, blood transfusion, SICU, and nursing care. Even if a transplant patient does not urgently require a donor organ, once an organ is available and harvested its short lifespan sends the hospital into a small crisis. However, the intensity of the crisis in preparing for a transplant depends on the organ. For example, a kidney transplant is a relatively simple 2-hour procedure that generally does not require the availability of a SICU bed, whereas a liver transplant - an expensive and intensive surgery - takes many more OR hours and requires SICU support for good results. A combined liver-kidney is among the most complex procedures requiring many resources and 10-12 hours of operating room time.

The wait time for a liver transplant is longer than for a kidney because livers are not as readily available (1 per donor in contrast to 2 kidneys per donor). The actual wait may be as long as five years and some patients may die before an organ becomes available. In contrast, kidney transplant patients do not die while waiting, because they can continue on dialysis.

In the case of transplants, after a physician from internal medicine makes the transplant decision, a transplant coordinator is needed to communicate and connect with all of the internal and external parties. The transplant coordinator is a boundary-spanner in continual contact with Eurotransplant, the donor center, the hospital’s SICU, and other hospital services.

Once an organ becomes available, there are very few situations that require any clinical decision-making; it becomes a logistical and organizational problem for the transplant coordinator. If the operating room, SICU beds, and regular beds are available, no medical decisions are necessary. However, if any part of the service process exceeds its capacity, e.g., if the SICU beds are full, or nursing is short-staffed, or the operating room is booked, then transplants require conferences, dialogues, information processing, negotiation, and crisis management among the experts. If, for example, there is only one liver available and there are two patients who would benefit from the procedure, a tough clinical decision must be made.
Exhibit 5
Growth in the Number of Transplant Patients by Organ
Exhibit 6

Understanding the Surgical Intensive Care Unit and the Patient Experience

There are 56 SICU beds in UMCL. Managers of general hospitals, even if they take into account the 1,782 beds, would suspect that 56 SICU beds represent excess capacity. Given its unique case mix however, Leuven's 56 beds cannot be fairly compared to general hospitals for two reasons.

First, the quantity of SICU beds is driven by the complexity or uniqueness of the case mix. For example, 95% (53 out of the 56) of the patients occupying its SICU beds are intubated and unconscious. A less severe case mix requires lower levels of technical care intensity, thus one would expect general hospitals to have far fewer surgical SICU beds - perhaps by as much as 80%. Indeed, a typical 1,200-bed general hospital may have as few as 12 SICU beds.

A second reason that the academic medical center cannot be fairly compared to a general hospital is that the latter define intensive care beds differently. For example, what most general hospitals refer to as an intensive care patient would be categorized as a medium care patient at UMCL. Therefore, when compared with a general hospital, it may be more accurate to refer to the 56 beds as 'super-intensive care' beds. There is a direct relation between the degree of intensity and the staffing requirements of the SICU.

As a general rule, the unit assigns one SICU nurse to care for two patients. In order to staff two full time equivalent (FTE) nurses per bed 24-hours-a-day, seven-days-a-week, SICU needs at least 30 FTE nurses on staff at all times (not counting supervisors and managers). The exceptions are in the period immediately after a lung or liver transplant when one nurse may take care of one patient and the other bed will not be occupied.

Ward rounds help to monitor SICU care quality while promoting the efficient utilization of the services. Performed twice a day, these rounds give caregivers a close look at the patients' conditions. The moment patients appear to be 'well enough' to leave the SICU, they are immediately transferred into a less intense, step-down unit. Whenever there is pressure on the SICU to find additional beds, (such as when SICU capacity is at 100%), patients may be transferred out of SICU sooner than would be ideal for their current condition. Although rare, patients weaned to the step-down unit may not get adequate care and must be re-admitted to the SICU.

Patients in the SICU comprise both elective, urgent, and emergency admissions. The elective admissions are mostly cardiac surgery patients. Unplanned admissions include trauma patients, transplants, or surgeries that develop sudden complications. Since a higher proportion of surgical patients end up in SICU than in an average general hospital (because of more severe surgery, pathology, co-morbidity, or age), UMCL needs a larger-than-average SICU.

A patient needs intensive care when one or more vital organ functions fail which puts her/his life in danger in the short term. Intensive care patients commonly suffer from heart failure and shock, insufficient breathing, or from liver or kidney malfunction or failure. If the patient has one of these conditions and has a good chance of surviving, then the patient goes to the SICU. The patient's chances for survival, however, are often difficult to predict. The worst mistake would be not offering a patient SICU care when that care might bring a benefit; a less serious mistake is offering SICU care when regular convalescent care would be sufficient.
Intensive care requires rapid information processing and rapid action. Speed is important because time becomes the critical variable that increases the chance of survival. But it is not only the speed that counts; the professionals have to use technological support—heart support, breathing support, and continuous kidney dialysis. Caring for a very sick patient requires that the unit function 24-hours-a-day, seven-days-a-week.

A journalist interviewed Bart and the SICU staff at UMCL. The next section contains excerpts from that interview. 21

Understanding the Patient Experience in Surgical Intensive Care

When the journalist entered the SICU, the head SICU nurse explained:

“Look at that patient over there. He is an 18-year-old man lying next to a breathing machine, has a tube in his nose, electrodes on his chest and several tubes in the arm. Next to his bed is a massive tower of machinery connected to monitors. This man had a traffic accident that resulted in brain trauma. He has been here a while.

“In his head there is a tube going all the way down to the ventricles to measure the pressure. That tube goes to a converter where the physical pressure is transformed into an electronic signal. That signal goes to a monitor which the nurses can see as a signal. The patient is connected through his throat to a breathing machine.

“If somebody needs breathing support for a short period a tube goes into the mouth. If it is needed for a long time the tube would damage the vocal chords, and in these cases the tube is inserted into a surgical opening in the front of the neck, under the vocal chords. Through his nose another tube goes to the stomach in order to feed him. Another part of the feeding goes to a catheter, a plastic tube with three openings. In this way, we can inject several solutions simultaneously into the blood: medication, pain therapy, and nutrition. One has to be careful to use the right mixture, since some medications cannot be mixed together.

“The stickers on the breasts are electrodes registering heart rhythms; in his pulse a tube sits in an artery. In this way blood pressure can be monitored continuously. We have to prevent this patient from developing a fever. The technical solution is a specially equipped bed. He is lying on a mattress through which cold water is being pumped. Whenever his body temperature goes up, the bed cools him down.”

She continued:

“In case of technical problems with the equipment, we can rely on the technical department. We regularly need them for routine things, for example, if we have a problem with the batteries in the pumps. For a battery to function optimally, it should be completely drained or empty. However, since our unit has to function 24-hours a day it is not possible to wait until the battery dies so we must change the battery before it is fully drained, and that increases battery costs in SICU as compared to other settings.”

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21 Excerpts from this interview are taken from an article entitled “Wij hebben niet genoeg bedden” (We don’t have enough beds) by W. de Broeck in a Belgian weekly magazine called Bonanza July 23, 2001. pp. 36-39.
Exhibit 6 (Cont’d)

The Nurses and Physician Experience

In the SICU the activity level is the same day and night. There are three shifts for nurses and two for physicians. The patient situation is always critical. The patients lie in a square room surrounding a central station. All rooms have windows because chronic intensive patients can easily get depressed when there is a lack of sunlight.

When the head nurse comes into the patient’s room, everyone speaks softly. According to the head nurse:

“In these six rooms there are patients who have been here a long time. The rooms are isolated because with weakened immune systems some patients could develop infections. Each of the rooms is separated from the corridor by a scrub and changing room. To avoid introducing bacteria, nurses and physicians wash their hands and wear sterile masks. If we are caring for patients with an infection, we wear yellow coats. No one wearing a yellow coat can walk into another patient’s room.

According to our procedures, an intensive care nurse cares for two patients and never leaves their bedside. If the patient needs a blood transfusion, we do not go to the transfusion unit: the blood has to come here. Since we staff 24 hours, seven days, we need approximately two FTE nurses per bed. However, if a patient has had a lung or liver transplant, we assign just one nurse to care for that patient because of the likelihood of infection.

She continued:

“The main activity of care occurs in the morning, when we wash the patient, comb their hair, trim their nails, etc. Patients who are here for long periods may develop diarrhea as a result of the antibiotics so these patients have to be changed and cleaned five or six times a day. We also clean the wounds and clean all the tubes we put inside the body.”

One of the intensive care (attending) physicians said:

“We are a bit like the general practitioner of the hospital. A good intensive care specialist has to think and act quickly, and be available permanently and know all the different organ systems. We must be able to link problems in different organ functions. Moreover, we must balance rapid information processing and accuracy over long periods. My typical workday is 12 hours or longer.”

He continued:

“Each morning, my day starts at 8 a.m. I meet with the intensive care physicians on call the previous night. We discuss new patients and the progress of the other patients. At 8.30 our team starts the first ward rounds. Every patient is examined carefully; we make new diagnoses, and change therapies if necessary. The ward round is finished at 1 p.m. We take about 30 minutes per patient. At 2 p.m. the family comes to visit and we are available to give information about the patient situation. At 3 p.m. we start a new round again with physical examinations of every patient and correction of therapy if necessary. Critical patients change very quickly. If we only did this once a day to save money the quality of care would go down quickly!”
Exhibit 6 (Cont’d)

At 7 p.m. the physician assigned to be on-call at night arrives and we discuss all patients. At 8.30 I go home. Everything we do is event-driven. The work is challenging, stressful, and emotional. I get much pleasure in my work because I am always interacting with colleagues, nurses, and my patients' families. The contact with the family I take very seriously. We are very open with the family and do not hide any information. I know all too well how important that is: my own father died in this surgical intensive care unit. That was a serious personal lesson. I learned that the family has many questions and you want answers to all of those questions. You can only handle the emotions that are part of the critical situation by asking many questions and talking a lot. If somebody’s son died in our SICU and afterwards they want to talk about this, I will always take time for that…”

Bart, chief of the SICU, then spoke:

“In stark contrast to the romantic image of television-based shows like ER, it is quiet in the SICU. Every now and then you hear people quietly passing by; however, there are no nurses jogging to save patients, no physicians running in and out, and no hospital beds being pushed at an irresponsible speed. When well managed, the SICU is quiet, except for beeps, and tranquil, except for an occasional resuscitation. But even then, no running, no screaming, it is merely routine emergency. That is the nature of a SICU.

One might expect that many patients die in a SICU. However, the mortality rate is low. We treat 2,500 patients per year and only 150 die. Patients who have had heart surgery rarely die; however, bone-marrow transplant patients who develop infections rarely survive. When the chances of survival are very small, families (with advice from the physician) can decide to stop all therapy to avoid suffering.

We try to avoid offering the patient unrealistic therapeutic solutions. If we are 100% sure that the patient would survive but suffer the tremendous indignity of living in a vegetative state, we may decide not to provide intensive care. The problem is we almost always have some doubt—we can never be 100% certain.

Before we decide to stop therapy, we consult with three experienced professionals. If one of the three physicians expresses some doubt, we resume therapy. If the new therapy fails, we begin a new case discussion that includes the family. If all agree, we may consider withdrawing and shift to comfort care procedures or Code 4. Code 4 means that a patient gets a higher dosage of pain medication to reduce suffering.

If a patient is brain dead, we may continue to care for him or her in SICU as a Code 5. If a liver is harvested for a transplant, the procedure must take place within 24 hours. Code 5 means we are keeping the organs alive in the body, which is the best incubator for a transplant situation. During a Code 5 we spend a great deal of our time and attention communicating with the family. Everybody gets enough time to say good-bye. When we are dealing with a small child, for example, we put the child in the arms of the mother so it can die peacefully. These are emotional moments for everyone involved.”
Bart continued:

"Today we have discovered medications and surgeries for diseases that people routinely died of 10 years ago. Take liver transplants. Fifteen years ago no one spoke about them. Last year we performed 50 liver transplants. This year it will be more. The result is more and more people require intensive care at some point during their therapy and we experience this every day. Today I have five beds available and there are 12 requests! As a result, we have to postpone surgeries. Surgical cancellations are unpleasant and discouraging for patients. Yesterday, we had the victims of two serious traffic accidents. At the same time we scheduled three transplants and two urgent heart surgeries, all within 72 hours. Because of the shortage of SICU beds we had to cancel three of the five planned cardiac surgeries.

Many people, including our own physicians, do not understand these trade-offs. They believe there must be something wrong with our SICU. But there is nothing wrong with the SICU. The government does not realize we just need extra beds. Otherwise in the near future we will have to tell people, should you have an accident, we can not guarantee that you will get the intensive care you need.

The government should realize that the cost of medicine only increases for two reasons: (1) patient care becomes more expensive; and (2) we can help more patients. Hence we need more beds! All intensive care specialists in Belgium will give you the same message. The intensive care medicine will have great problems for lack of money and nurses. The discrepancy between what we can do and what we can't increases each day. I think in 20 years the hospital will be mainly intensive care. Although it is expensive, intensive care is the engine of the modern hospital."

Bart concluded with a comment:

"Tubes, wires and machines that beep continuously are the way patients and their families experience the intensive care unit. The tubes, wires and machines are safe, but the intensive unit has problems. Scientific and technological progress can help more and more people, but our capacity has remained the same. If we do not get additional money for beds and staffing, intensive care medicine will die."
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