

Optimizing your Cath Lab Activity Levels

Seven Deadly Sins in Cath Lab Operations Management

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- 1 Absence of a well-defined planning and scheduling process
- 2 Only clinical information is captured in the HIS/CVIS
- 3 Poor patient preparation
- 4 Cardiologist schedules involve only ½ days or less in the cath lab
- 5 Infrastructure does not support patient flow
- 6 No daily coordinator role in the team
- 7 Unclear division of roles and responsibilities between cath lab nursing and support staff



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Abstract

This article describes seven deadly sins related to cath lab operations management. Many cath labs globally suffer from most of these sins. For a medium-sized cath lab with four procedure rooms, the yearly potential loss is equivalent to 2,400 cases per year. Fixing these shortcomings results in higher cath lab utilization, lower operating costs, higher activity levels, increased revenue, and ultimately, better patient access to care.

Table 1. Typical Cath Lab Efficiency KPIs (Data Source: Medtronic Benchmark)

KPI	Short description	Best-in-class	Average value	Average annual potential for 4-lab cath lab
Productivity	No. of cases/lab/year	1,800-2,000	1,200-1,500	2,400 additional cases/year
Gross procedure time	Average time needed per procedure (wheels in – wheels out)	1 hour	1.5 hours	2 hours/day
Utilization	Percentage of time a patient is present in the room	75-80%	50-60%	25-30%/lab

Background

Historically, the cath lab has always been the domain of the cardiologist. Until recently, attention to cath lab efficiency was limited. With healthcare costs rising and budgets being cut worldwide, the focus of cath lab operations management has shifted towards improving efficiency and not just clinical outcomes. A key driver is to either be able to deliver more cases with the same amount of resources, or to do the same number of cases with fewer resources. In Table 1, the three most important key performance indicators (KPIs) related to cath lab efficiency (and indirectly, to activity levels as well) are given. For the average cath lab, there is usually significant improvement potential. By increasing

productivity and utilization, and by decreasing the overall procedure time, the number of cases done within the same amount of time and with the same amount of staff can grow significantly. This also creates additional revenue opportunity for the hospital.

As already mentioned by Teulings¹, the primary focus in the cath lab is on clinical performance, and therefore planning of cases, staff, rooms, and beds is typically handled by non-specialized staff. Due to the complexity of the cardiology domain, many common hospital information systems (HIS) do not fully support the cardiology patient care trajectory. For example, they may be unable to support the following: (1) a diagnostic procedure can precede the actual procedure; (2) new

patients are distributed across cardiology and cardio-thoracic surgery; (3) complex medical decision-making takes place in multi-disciplinary meetings; and (4) the cardiology environment is highly technological, and material and equipment intensive. As a result, cardiology departments and heart centers tend to run their own cardiovascular information systems (CVISs). These CVISs usually do a good job in supporting the medical decision-making process; however, the planning and scheduling components are minimal, resulting in manual processes, limited performance measurement, and ample room for improvement efforts.

This article identifies seven deadly sins in cath lab operations management and suggests ways to improve. Through

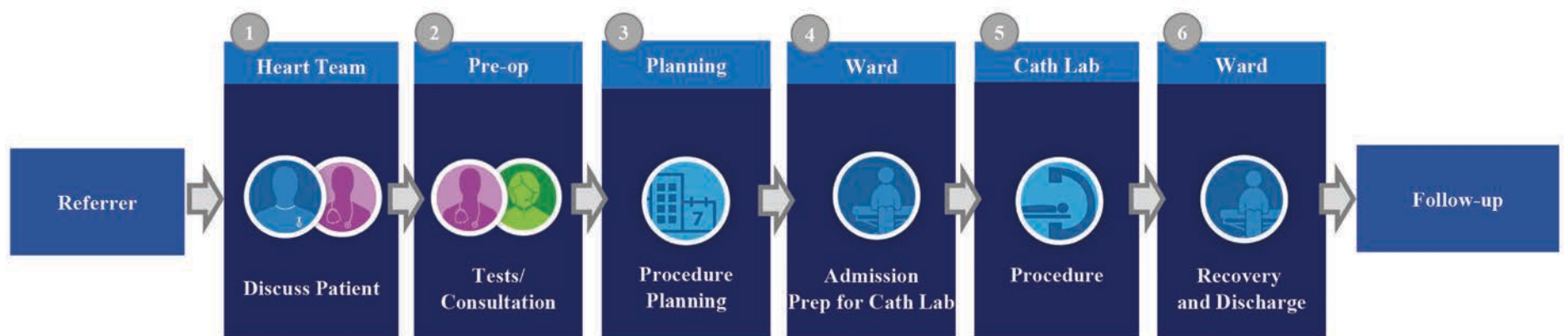


Figure 1. Typical cath lab patient flow



Figure 2. Planning & scheduling cycle

systematic elimination of the ‘cath lab sins’, it is possible for best-in-class performance to be achieved.

Deadly Sin 1: Absence of a Well-Defined Planning and Scheduling Process

Within planning and scheduling, three different levels can be distinguished; namely, strategic planning, tactical planning, and operational scheduling. Each level has its own planning horizon. Table 2 summarizes the characteristics of the three planning levels (based on Hulshof PJH et al²). In a well-defined planning and scheduling process, sufficient attention is paid to all levels, and the planning and scheduling process follows a yearly cycle (Figure 2).

Deadly Sin 2: Only Clinical Information is Captured in the HIS/CVIS

Next to the clinical monitoring of the procedure and the patient, the patient preparation process and patient flow on the day of the procedure is also captured in the HIS/CVIS. Communication of real-time procedure schedules helps all

patients account for 80% of preparation work. Separating the low- from the high-complexity patient flows allows for a faster work-up of the first category, while providing tailored preparation for the latter category.

Deadly Sin 4: Cardiologists' Schedules Include Only ½ Days or Less in the Cath Lab

A pre-condition for high cath lab efficiency is that cardiologists are present in the cath lab all day. Increase or decrease in the length of the morning cath lab shift can then easily be accounted for in the afternoon shift, since it is carried out by the same physician, thus introducing more flexibility in online case and staff planning. In the electrophysiology domain, it is quite common to work for an entire day in the electrophysiology lab, due to the usually long (2-4 hours) duration of the procedures. In some labs, however, interventional cardiologists tend to work only morning or afternoon shifts in the cath lab,

In an average cath lab, it is evident that there is huge improvement potential. The focus on operational excellence through addressing the ‘seven deadly sins’ described in this article can allow teams to perform up to 50% more procedures with the same level of resources.

concerned parties stay informed regarding the status of procedures in process, and keeps the catheterization schedule transparent for improved physician relations.³

Deadly Sin 3: Poor Patient Preparation

The first step to the actual cath lab procedure is the patient preparation. In a well-organized patient preparation process, a timeline exists where all required steps in this process, their chronological relationships (if any), responsible healthcare provider(s), and required timespan are all defined.

The process is supported by the HIS/CVIS, keeping track of the progress of all preparation activities, and pushing alert messages to the planner and responsible healthcare providers if a delay occurs. Patients can only be put onto the actual cath lab planning if all the required preparation tasks have been completed. The patients’ complexity can be characterized by the Pareto principle, where approximately 20% of

while having other obligations (outpatient clinic, teaching) for the other half of the day.

Deadly Sin 5: Infrastructure Does Not Support Patient Flow

In an ideal world, the hospital infrastructure in and around the cath lab supports patient flow. There is an adequately staffed patient preparation (‘holding’)/recovery area in or near to the cath lab. In this area, patients can be prepped, monitored pre- and post- procedure, and await transport to the nursing wards after their procedure. For day surgery patients, the best practice is to co-locate an outpatient unit near the cath lab to reduce patient transport requirements. Within the cath lab, patient, staff and material flow are separated as much as possible. The corridors are wide, to allow for easy bed and material handling. The cath lab has a clear entry, equipped with a reception desk or an automated access management system, thus preventing patients, relatives, carers

Symptoms of Sin 1: Absence of a Well-Defined Planning and Scheduling Process

- Focus is exclusively on the operational planning level
- Cath lab time is not distributed optimally over the patient mix
- Long wait list and access times for certain procedures; simultaneously unused cath lab capacity for other procedures due to a lack of patients
- No clustering of procedures
- Not allocating (sufficient) time to (semi-) urgent and inpatients; urgent cases come as a surprise
- Disruptions, chaos and elective patient cancellations, high levels of firefighting
- Inefficient use of cath lab time (utilization <70%)
- Storage locations far from labs

Symptoms of Sin 2: Only Clinical Information is Captured in the HIS/CVIS

- Difficult and time-consuming for planner to obtain an overview of all patients on the waiting list and their current status
- No overview during the day on the progress of procedures and possible delays
- Difficult to fit in emergency and semi-urgent patients
- Planning and scheduling is a time-consuming process, involving a lot of ad hoc activities and (too) many stakeholders
- Use of paper records, agendas or calendars, excel sheets, word documents, and stand-alone tools
- Issues with document ownership and keeping track of changes within documents
- Patient records need to be manually entered into other IT systems
- Lack of management information to monitor patient flow, production, etc.

Symptoms of Sin 3: Poor Patient Preparation

- Non-adherence to medical protocols
- Quality and safety issues
- Patients arriving at the cath lab not correctly prepared for the procedure
- Unavailability of material and devices
- Last-minute (in-lab) patient cancellations
- Last-minute changes in planning
- Low patient satisfaction

Symptoms of Sin 4: Cardiologists' Schedules Include Only ½ days or Less in the Cath Lab

- Introduction of a second start-up moment around noon and thus additional delay
- Limited possibility to switch patients between the morning and afternoon shifts or vice versa, due to planning inflexibility and differences in physician skills
- Extremely long changeover times (1-2 hours) between the last morning patient and first afternoon patient
- An average of 1-2 cases lost per room per day
- Low cath lab utilization (<70%)

Symptoms of Sin 5: Infrastructure Does Not Support Patient Flow

- Waiting for patient transport to and from the cath lab
- Delay in patient transport due to waiting for elevators
- Long distance to between the cath lab and wards, including CCU/ICU
- Cath lab nursing staff need to monitor patients before and after the procedure
- Limited number of patients (<50%) in outpatient procedure program
- Conflicting patient, staff and material flow; small corridors and rooms which are difficult to clean, leading to quality and safety risks
- Delay in the cath lab program due to waiting for patients to arrive

Table 2. Planning Levels (Text Based on Hulshof PJH et al²)

Planning level	Summary	Planning horizon	Examples
Strategic	Addresses structural decision-making. It involves defining the organization's mission (i.e., "strategy" or "direction"), and the decision-making to translate this mission into the design, dimensioning and development of the health care delivery process.	Long planning horizon, typically >1 year. Decisions are based on highly aggregated information and forecasts.	Determining cath lab location(s), dimensioning resource capacities (e.g., acquisition of radiographic equipment, baseline staffing) and deciding on the service and case mix.
Tactical	Translates strategic planning decisions to guidelines that facilitate operational planning decisions. Addresses the organization of the operations/execution of the health care delivery process (i.e., the "what, where, how, when and who"). Step 1: Characterize patient groups on disease type/diagnose, urgency and resource requirements. Step 2: Available resource capacities, settled at the strategic level, are divided among these patient groups. Dates or time slots can be added, creating blueprints for the operational planning that allocates resources to different tasks, specialties, and patient groups.	Medium planning horizon, typically 3-12 months. Demand has to be (partly) forecasted, based on (seasonal) demand, waiting list information, and the "downstream" demand in care pathways of patients currently under treatment.	Staff-shift scheduling and the (cyclic) block schedule that allocates cath lab time capacity to patient groups. Temporary capacity expansions like overtime, hiring staff, or using a staffing agency are also part of tactical planning.
Operational	Often referred to as scheduling. Involves the short-term decision-making related to the execution of the health care delivery process. Following the tactical blueprints, execution plans are designed at the individual patient level and the individual resource level.	Short planning horizon. In operational planning, elective demand is entirely known and only emergency demand has to be forecasted.	Split into online and offline scheduling (see below).
• Offline scheduling	Reflects the in advance planning of operations. It comprises the detailed coordination of the activities regarding current (elective) demand.	Typically current week to 3 months out.	Patient-to-appointment assignment, staff-to-shift assignment, and cath lab case scheduling.
• Online scheduling	Reflects the control mechanisms that deal with monitoring the process and reacting to unplanned events. This is required due to the inherent uncertain nature of health care processes.	Typically real-time updates to within 24 hours horizon.	Real-time dynamic (re)scheduling of elective cases, for example, to accommodate an emergency case.

Symptoms of Sin 6: No Daily Coordinator Role in the Team

- Late starts
- Long changeover times
- Complicated decision-making processes, especially where last-minute changes in the program are required, for example, due to emergency patients being admitted
- Staff regularly work overtime
- Many of the last cases of the day are cancelled, resulting in early finishes
- Rescheduling of elective cases
- Difficult to accommodate emergency and urgent patients
- The coffee/break room has a higher utilization than the cath labs
- Working in overtime in one lab and an early ending in another lab at the same time
- Absence of a single contact point for hospital staff within and outside the cath lab

Symptoms of Sin 7: Unclear Division of Roles Between Cath Lab Nursing and Support Staff

- Cath lab nurses are also responsible for materials management, case scheduling, staff scheduling, cleaning, etc.
- Team member with coordinator role is also scheduled as procedure nurse
- The cath lab is overstaffed, but at the same time, cases cannot be scheduled due to a lack of nursing staff with the right skill set

and non-cath lab staff from entering the clinical area. The rooms are spacious, easy to clean, and efforts have been made to reduce noise. All common quality and safety regulations are in place.

Deadly Sin 6: No Daily Coordinator Role in the Team

During the day, the progress of the cath

lab program is closely monitored by a team member. This is (for facilities with four labs or more) a dedicated role, focusing on starting on time, scheduling of emergency and semi-urgent cases within the elective program, eliminating delay between two consecutive cases, finishing the cath lab program on time, and dealing with unforeseen circumstances. The

coordinator role may alternate between team members, but it needs a clear mandate, and clearly structured roles and responsibilities within the cath lab.

Deadly Sin 7: Unclear Division of Roles Between Cath Lab Nursing and Support Staff

There is a clear division of roles, based on patient demand and the skill set of nursing staff. All non-clinical work is done by dedicated support staff, including case and staff scheduling. Since recruiting cath lab nurses is becoming a bigger challenge every day, this is very important.

Conclusion

In an average cath lab, it is evident that there is huge improvement potential. The focus on operational excellence through addressing the 'seven deadly sins' described in this article can allow teams to perform up to 50% more procedures with the same level of resources. When a cath lab team gets this right, there is also an

add-on effect, delivering improvements in patient safety and clinical quality of care. When the operational running of an area is smooth, clinical staff are freed up to focus on delivering outstanding care to their patients. ■

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