What Should a New Team Member Do on Day 1 in the Cath Lab?

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Every July, we welcome our new cardiovascular trainees (aka, fellows). The fellows on the cath rotation become the newest additions to our cath lab team, most with no prior experience in this area. For many years, I have had the honor (and sometimes the pain) of teaching these beginning cardiologists how to do a cardiac cath. The new fellows are always anxious and curious at the same time. In thinking about their upcoming experience and expectations, I asked one of the fellows, "What were you thinking about on Day 1 as you came into the cath lab?" His answer: "Where do I start? What am I supposed to do? (And what will Kern think of me?)" Before answering these questions, I want to remind us that over the year, the cath lab often gets other new team members including nurses, technologists, and students, as well as additional physicians in training, or new physicians to the hospital. What is a good starting place for someone coming into the lab and how does that person become an integral part of an already well-functioning team?

Although described In the first chapter of the *Cardiac Catheterization Handbook*,[1] I thought it would be good to review the starting point for a new fellow (or anyone), what they should do, and what they will need to know.

The Starting Point

The 5 keys for a new fellow on DAY 1 (Figure) are: (1) Show up early and suit up. The day generally starts early in the cath lab. (2) Keep your mind open, listen more, speak less (i.e., mouth closed), and your questions will be answered. (3) Introduce yourself to the team and be helpful when possible. As time goes by, the team will see value in your work in the lab. (4) Be prepared (know the patient info, indications, etc.). The attending physician is depending on your input to help teach and care for the patient. (5) Learn the lab routine, watch, and try to understand why things are done in a certain way. The lab experience is an apprenticeship and is one of the pillars of cardiology.

What Happens in a Cath Lab?

Here's a quick overview of the "routine" in the lab:

1. In the pre-procedure area, the patient is seen by a team member (often a fellow, but could be a nurse or other team member) who explains to the patient what is going to happen. This team member often reviews the indications for the planned procedure. The method, risks, and anticipated results are described.
2. Informed consent is obtained, preferably in the presence of a family member. Depending on the procedures, special preparations may be needed (Table 1 lists procedures that may accompany coronary angiography).
3. Orders and chart notes are written. The patient is then moved to the cath lab.
4. When the patient arrives in the laboratory, he/she is greeted by the nurses, moved from a holding area into the angiographic suite, and is prepared and draped. On the cath lab table, the patient is made comfortable, and intravenous (IV) lines and electrocardiograms (ECGs) are secured.
5. A "time out" is performed to ensure the right patient, right site, right procedure, and correct lab data are present. Premedication is given after the time out.
6. Vascular access is obtained according to the patient's procedural need. Radial artery access is now routine in most labs. Venous access can also be obtained in the same arm as arterial access.
7. Coronary angiography usually follows, as it is the most common procedure performed in the lab, but of course, there will be many other procedures to be done as well. Right-sided heart catheterization may be performed as indicated.
8. Percutaneous coronary intervention (PCI) may proceed ad hoc if consent was obtained in advance. A second time out is recommended.
9. At the conclusion of the procedure(s), the catheters are removed, followed by hemostasis. For radial artery hemostasis, a pressure band, usually with an inflatable balloon, is used. For femoral access procedures, manual compression or a vascular closure device (VCD) is used. Two to four hours of bed rest with observation before discharge is usually sufficient.
10. Before discharge, the patient is checked with attention to the access site(s). It is good practice to provide the patient and the family with the procedural findings and inform the referring physician of the same results. Scheduling for further treatment is made after review by the attending and referring physicians.

What's My Role? Who Comprises the Catheterization Team?

New team members may not know all the players. The composition of a catheterization team varies among laboratories. The smallest functioning unit consists of a physician, an assisting physician (fellow) or nurse, a nurse circulator or recording technologist, and a nurse outside the laboratory able to assist. For more specialized procedures, the team is increased appropriately. Each member of the team assumes an important role during the procedure.

1. A circulating nurse or technologist acts to address all aspects of care of the patient during routine cath procedures and delivers emergency care when required.
2. A scrub nurse or technologist assists the operating physician at the cath table with all equipment, supplies, and medications used during catheterization. This person assists in the exchanging of catheters and other specialized maneuvers.
3. A radiologic technologist is trained in x-ray principles related to cardiovascular procedures, cineangiography, fluoroscopy, and the use of power contrast injectors and digital cineangiographic imaging systems. He/she is also at the table.

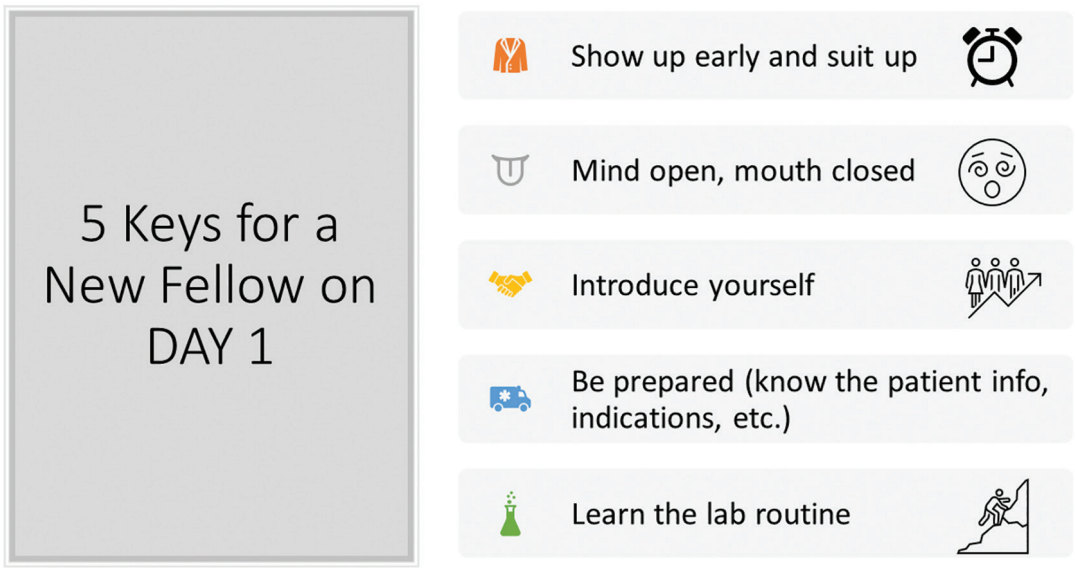

Figure. Advice for new fellows that may also be useful for new team members in the cath lab.

Table. Procedures That May Accompany Coronary Angiography.*

Procedure	Comment
1. Central venous access	Used as IV access for emergency medications (femoral, internal jugular, subclavian) or fluids, temporary pacemaker (pacemaker not mandatory for coronary angiography)
2. Hemodynamic assessment	
a. Left heart pressures	Routine for nearly all studies (aorta, left ventricle)
b. Right heart pressures	Not routine for coronary artery disease procedures. Combined left and right heart pressures are commonly obtained for valvular heart disease; right ventricular dysfunction, pericardial diseases, cardiomyopathy, intracardiac shunts, congenital abnormalities
3. Left ventriculography	Routine for many studies; may be excluded with high-risk patients, left main coronary or aortic stenosis, severe CHF, renal failure
4. Internal mammary artery selective angiography	Not routine unless used as coronary bypass conduit
5. Femoral angiography	Routine for femoral arterial access assessments before closure device
a. IC/IV/sublingual NTG	Useful during coronary angiography and intracoronary device manipulations
6. Aortography	Routine for aortic insufficiency, aortic dissection, aortic aneurysm, with or without aortic stenosis; routine to locate bypass grafts not visualized by selective angiography, anomalous coronary origin
7. Cardiac electrophysiologic studies	Usually performed a separate setting to assess arrhythmias or perform catheter-based ablation procedures
8. Coronary or structural heart interventions	Coronary stents, rotoblator, etc., with FFR/CFR/IVUS/OCT for lesion assessment Usually performed at a separate setting, TAVR, balloon valvuloplasty
9. Special procedures	Myocardial biopsy Transseptal or left ventricular puncture
9. Vascular closure devices	Routine for femoral access hemostasis

CFR, coronary flow reserve; CHF, congestive heart failure; FFR, fractional flow reserve; IC, intracoronary; IV, intravenous; IVUS, intravascular ultrasound imaging; NTG, nitroglycerin; OCT, optical coherence tomography; TAVR, transaortic valve replacement.

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4. A monitoring technologist is responsible for observing and recording the hemodynamic or electrophysiology data, and keeping the physician apprised of changes in cardiac pressures and rhythms. The technologist interprets pressure and ECG waveforms, and operates all physiologic recording equipment.

Communication in the Catheterization Laboratory: The Key to Success

New team members may not immediately appreciate that clear communication in the lab is critical. Sharing patient information and scheduling at the beginning of the day will improve efficiency. Keeping the physician informed as to the status of his/her procedure will enhance his/her ability to manage time and minimize delays in operations.

Likewise, communication from the physician to the staff will assist their ability to move patients into and out of the laboratory to satisfy the needs of the numerous operators and types of procedures, as well as ensure the availability of special equipment.

Communication at the "table" during the procedure will also improve lab efficiency. The informed team can anticipate equipment, catheter and pharmacologic needs. It will shorten the setup and lab time. By letting the team know where the operator is in the procedure, the next steps can be anticipated. The recording technologists appreciate these announcements for documentation.

Everyone in the lab should be "in the game," watching and listening, and be ready to act without undue delay. At the same time, communication from the "room" back to the "table" improves efficiency by clearly acknowledging requests from the operating table, reducing redundant and unnecessary repetition of orders. Clear and open two-way communication, especially under critical portions of procedures, improves safety through error reduction and timely performance of the catheterization.

Clarity, Brevity, and Wit Are the 3 Pillars of Good Communication

1. The physician, as well as the staff, sets the tone of communication in the laboratory, like a pilot with the "right stuff": cool, clear, and confident.
2. Orders from the "table" should be acknowledged clearly. Just as military efficiency is built on this dictum, so should that of the well-run laboratory. It is disturbing to request medications and supplies and not know if someone has heard the request and is attending to it.
3. Repeat orders back to reduce errors.
4. Operators should speak to individuals by name, e.g., "Bob, please give 5000 units heparin IV." Then everyone knows who is supposed to act.

Laboratory Atmosphere and the Patient's Confidence Builder

1. In the laboratory, a confident, professional attitude should be always adopted by all personnel. Straightforward routine communication should occur quietly and without alarming tones. Patients should be addressed directly, by name, to let them know what their instructions are, as opposed to requests or communications to co-workers.
2. The circulating team members should be confident, reassuring, and professional in every respect. The patient feels helpless and is tuned in to all types of stimuli (especially verbal). Extraneous conversation is distracting for the patient and the operators. This is especially true when the patient is draped in a manner that does not allow him or her to see his or her surroundings. In the laboratory, all "players" should be in the game; that is, focused on the patient's needs and safety, which become paramount goals.
3. Background music is soothing but should never distract the team or operators from the procedure.
4. Communication with the patient (and family) before, during, and after the procedure ensures a satisfied and well cared-for individual.
5. Patients overhear hallway conversations. Factory worker attitudes of "another coronary" or "another ST-segment elevation myocardial

infarction (STEMI)" should be avoided. Each procedure is potentially life-threatening and should be undertaken seriously and with concern, as if each patient were a family member.

Explaining the Procedure and Obtaining Consent

Consent should be obtained by the operator or his or her assistant, but is usually obtained by a physician. The new fellow is tasked with explaining the procedure and obtaining consent. Since his/her experience is limited in the beginning, this role should be demonstrated with a more seasoned person initially.

Here's the short version. After introducing yourself, it's helpful to establish rapport and begin building the patient's confidence in the team. I often ask about the patient's understanding of why we are going to do the cath. Listening to the patient is just as important as explaining what will happen. The procedure should be discussed with the patient in terms that he or she can understand. I recommend using simple language, and lay terms at a 4th-grade English level, no matter the patient's presumed educational level or background. Patients are nervous and do not always receive the information you are providing.

Clearly explain the purpose of the procedure —"to look at the arteries in the heart (coronary arteries)" and "to examine the heart muscle (ventricular function)." Simple terms are best so that the patient can grasp the concepts. The clinician should explain what small catheters are (plastic tubes similar in size to spaghetti) and that they will be used to put x-ray contrast solution ("dye") into the arteries supplying blood to the heart.

Explain that the procedure is not painful because the arteries are not sensitive to the passage of the small catheters. The heart muscle may be weakened (infarcted) in certain areas, and the way to identify this weakness is to take x-ray pictures of the "main pumping chamber" (i.e., the left ventricle). A simple, forthright explanation facilitates the operator team–patient relationship and confidence that the patient will have a safe and comfortable procedure.

Explain the risks of routine cardiac catheterization. Major risks include stroke, myocardial infarction, and death, usually less than 1 in 10000. Minor risks include vascular injury, allergic reaction, bleeding, hematoma, and infection. If PCI is anticipated, consent for this should be obtained as well as discussing options for medical therapy, stenting, or coronary bypass surgery in advance of the procedure.

Explain any portions of the study used for research and the associated risks (e.g., electrophysiologic study — perforation, arrhythmia [<1:500]; pharmacologic study — varies depending on drug and study duration; intracoronary imaging or sensor-pressure wire study — spasm, myocardial infarction, embolus, dissection [<1:500]).

Provide the necessary information and explanation, but try to not overwhelm the patient. It is good practice to include the family when explaining what will happen and the possible outcomes you expect.

After explaining all aspects of cardiac catheterization, the patient can sign the informed consent document. Informed consent entails a shared decision-making process, in which there is a two-way exchange of pertinent information. This information allows the patient (and family) to make a fully informed decision based on his or her expectations, risks of the procedure, and choice of alternatives. If the patient is reluctant to have the catheterization, the procedure can be deferred until the referring physician speaks to the patient to clarify why the procedure is necessary. A reluctant patient should never sign the consent form. When possible, the family should be present when the procedure is discussed. This approach encourages a cooperative and sympathetic appreciation of the procedure, the risks, and the expected outcome.

Post-Procedure Review

A new fellow or team member should review every procedure until he/she becomes well informed and comfortable with how things work and what their role is. For routine procedures, the entire team can continue to run through the day's work, moving forward with each new case. For complicated procedures, the team should pause and discuss what will be needed for both the routine part and what might be needed for anticipated problems or potential complications (e.g., "we might need a left ventricular assist device for this complex PCI"). For any procedure having a complication, the entire team should gather for a case review to understand what happened and if anything could have been done better to prevent delay or bad outcomes.

The Bottom Line

For the new team member, Day 1 can be daunting. For our best results, best working environment, and best patient care, we should all remember what our first day was like and reach out to help teach and support our newbies. ■

Reference

1. Sorajja P, Lim MJ, Kern MJ. *Kern's Cardiac Catheterization Handbook,* 7th ed. Philadephia, PA: Elsevier; 2019.

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