Cath Lab Digest

A product, news & clinical update for the cardiac catheterization laboratory specialist

CATH LAB SPOTLIGHT

UW Health University Hospital

Holly Studier, MSN, RN, CCRN; Carole Willis, BSN, RN; Matt Klaren, BS, RCIS; Joe Gissing, MSN, RN; Tricia Griffiths, BSN, RN; Aimee Hernandez, BS, RCIS; Cara Miller, RT(R), RCIS; Amy Shepard, MS, RN, ACNS-BC, CCRN
Madison, Wisconsin

Tell us about your cath lab and facility.

UW Health University Hospital is a 505-bed facility affiliated with the University of Wisconsin School of Medicine and Public Health in Madison, Wisconsin, in the south central part of the state. University Hospital has been ranked as the top hospital in Wisconsin for the past 11 years and recently received its fourth Magnet designation. The cath lab is part of the Heart and Vascular Procedure Center (HVPC), which includes adult and pediatric invasive cardiology and electrophysiology (EP), along with a prep and recovery area for those patients. The 111-bed pediatric hospital, American Family Children's Hospital (AFCH), is connected to University Hospital by a sky bridge and houses one hybrid lab used for pediatric and adult congenital cath and EP cases.

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In This Issue

We teach the fellows that before each cath procedure, we need to review the patient's electrocardiogram (ECG), chest x-ray, and lab data. We discuss the indications for the procedure which, at times, may not always correspond to the referring physician's or nurse practitioner's history. The fellow then completes the assessment and obtains a signature on the informed consent. We recently had a patient who presented us with a challenge to know whether the informed consent was valid, something I thought we'd address in this editor's page.

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CUTTING-EDGE PERSPECTIVES

Selected Proceedings From the 2024 International Andreas Gruentzig Society (IAGS) Clinical Conference

Featuring presentations from J. Dawn Abbott, MD; David Wood, MD; William O'Neill, MD; Jimmy Kerrigan, MD; Toby Rogers, MD; Dmitriy Feldman, MD

Compiled and edited by Gary Rowbury; Laurie Onopa; H. V. ('Skip') Anderson, MD

The International Andreas Gruentzig Society meets biennially to discuss the latest topics in interventional cardiology and related fields. The 17th Biennial IAGS meeting was held from January 30 to February 2, 2024, in Chiang Rai, Thailand. IAGS is an international educational society of physicians and scientists. Society members cooperate in the advancement of knowledge and education through research, publication, study, and teaching in the fields of cardiology and vascular disease. Conference proceedings are published in the *Journal of Invasive Cardiology*, the official journal of the IAGS, and selected presentations are shared herein.

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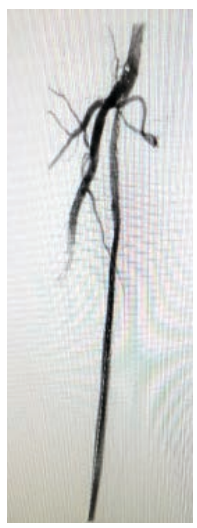
CHRONIC LIMB-THREATENING ISCHEMIA (CLTI)

Treating a CTO of the SFA Using Auryon Laser Atherectomy in a CLTI Patient

Nader Chadda, MD, FACC, FSCAI; Ilyas Chadda

History

The patient is a 77-year-old man with diabetes mellitus, congestive heart failure, and abdominal aortic aneurysm status post repair with stent graft placement, who has been suffering from bilateral foot wounds that have been nonhealing. The wounds have been present for more than six months. The patient has also been experiencing lifestyle-limiting bilateral leg and foot pain occurring at rest and with minimal ambulation for more than six months.



A recent arterial duplex ultrasound of the lower extremities was abnormal, demonstrating monophasic waveforms indicative of a total occlusion of the right superficial femoral artery (SFA). In addition, the arterial duplex ultrasound demonstrated a significant distal left SFA stenosis. The decision was made to proceed with lower extremity angiography and possible intervention.

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UW Health University Hospital

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What is the size of your cath lab facility and number of staff members?

The HVPC is home to seven labs in total: one adult hybrid lab, three adult cath labs, two adult EP labs, and one pediatric hybrid lab used for pediatric and adult congenital cath and EP procedures. In addition to the procedural areas, the HVPC has a connected 14-bed prep/recovery area to care for all outpatients and general care/intermediate care-level inpatients. The HVPC staff consists of care team leaders (CTLs), cardiovascular/EP senior technologists, registered nurses, cardiovascular/EP technologists, procedural and scheduling coordinators, and nursing assistants (NAs). In addition to the procedural staff, we have three clinical program coordinators who help to ensure patients are triaged appropriately and five RN cardiovascular coordinators (two for interventional cardiology and three for structural heart) who provide patient education and ensure patients are prepared for their procedures. We have one operations process analyst who helps coordinate equipment maintenance, and assists with regulatory requirements and communication between the clinical team and coding and revenue departments. Our lab is supported by eight interventional cardiologists (six adult and two pediatric) and five advanced practice providers (APPs).

What are the roles in your leadership team?

Local level leadership in the HVPC includes:

- Invasive Cardiology Manager Holly Studier, MSN, RN;
- Invasive Cardiology RN Supervisor Carole Willis, BSN, RN;
- Invasive Cardiology Tech Supervisor Matt Klaren, BS, RCIS.

Our management team covers adult and pediatric interventional cardiology, EP, and our prep/recovery areas. The charge personnel for each program, including cath lab, EP, pediatrics and prep/recovery, manage day-to-day workflow within their respective areas.

- Tricia Griffiths, BSN, RN, in her role as Clinical Program Coordinator, plays a pivotal role in coordinating complex procedures that involve multiple resources and anesthesia.
- Amy Shepard, MS, RN, manages the STEMI and Shock programs to ensure rapid response and quality care for patients having medical emergencies.

Physician leadership includes:

- Giorgio Gimelli, MD, FACC, Medical Director of the Interventional Cardiology Section and UW Health Adult Cardiac Catheterization Laboratory. He also serves as Medical Director of the UW Health Transcatheter Valve Replacement Program.
- Luke Lamers, MD, serves as the Medical Director of the Pediatric Cardiac Catheterization Laboratory.
- Amish Raval, MD, is the Medical Director of the UW Health STEMI Program.
- Kurt Jacobson, MD, is the Director of the University of Wisconsin Interventional Cardiology Fellowship Program, Director of the UW Health Pulmonary Embolism Response Team and Co-director of the UW Health Left Atrial Appendage Closure for Stroke Prevention in Afib Program.
- Gregory Tester, MD, is the Co-Director of the University of Wisconsin Interventional Cardiology Fellowship Program.

What procedures are performed in your cath lab?

In our cath lab, we perform complex interventional cardiology procedures, including structural heart procedures, thrombectomy, brachytherapy, chronic total occlusion (CTO), alcohol septal ablations, extracorporeal membrane oxygenation

Figure 1. Heart and Vascular Procedure Center staff. ***Front row (left to right)*****: Emily McArdle, RN; Kim Marti, RN; Michael Sullivan, CVT; Aimee Hernandez, CVT-Apprentice Program Manager; Hannah Schwemmler, CVT; Nicole Rutledge, CVT; Ashley McCullough, RN; Corey Dolan, RN.** ***Rows 2 and 3:*** **Genee Anderson, CVT; Cassie Koczan, CTL; Jeff Wolf, CVT; Becca Pierce, CVT; Kathy Hunter, Patient Scheduling Coordinator; Carole Willis, Invasive Cardiology RN Supervisor; Kyle Curran, RN; Matt Klaren, Invasive Cardiology Tech Supervisor.**

(ECMO), percutaneous left ventricular assist device (PLVAD), and coronary lithotripsy, as well as other therapies. Additionally, the cath lab participates in the heart transplant program by performing right ventricular (RV) biopsies, coronary angiograms, and right heart catheterizations. Combined with our EP lab, we typically do about 100 procedures per week. Our staff is a relatively young group, with most of our nursing staff having five or fewer years of cath lab experience, along with a few seasoned team members with 6 to 10+ years of experience. We require all nurses to be experienced in critical care and/or emergency care in our procedural areas, and intermediate level care for our prep/recovery areas. Our procedures are performed by staff in four roles: monitor, scrub, circulator, and nurse, with one staff member required to be a nurse. As part of an academic medical center, we work closely with fellows and frequently host student observers. We use cardiovascular technologists (CVTs) and do not require that they have American Registry Of Radiologic Technologists (ARRT) licensure. The registered cardiovascular invasive specialist (RCIS) credential is only required for our CVT-Senior positions, but is encouraged for all CVT positions. There is a yearly bonus associated with this credential. We are a Magnet facility and encourage our nursing staff to maintain certification and earn advanced degrees. We are in the process of initiating a clinical ladder for the direct care nursing staff, with the goal of eventually including a clinical ladder for CVTs as well.

Figure 2. **Participants in the CVT Apprenticeship Program (left to right): Genee Anderson, CVT; Aimee Hernandez, CVT-Apprentice Program Manager; Jeff Wolf, CVT.**

If your cath lab is performing structural heart interventions, can you share your experience?

UW Health serves as a referral center for structural heart procedures for a large region of southcentral Wisconsin and northern Illinois. Structural heart interventions performed at UW Health include transcatheter aortic valve replacement (TAVR), left atrial appendage occlusion (LAAO), transcatheter mitral valve repair (mitral TEER), transcatheter pulmonary valve replacement, atrial septal defect (ASD), patent foramen ovale (PFO), and paravalvular leak closures. We are currently working on introducing transcatheter tricuspid repairs. Our most commonly performed structural heart procedure is TAVR, available at UW Health since 2012, with 350-400 TAVR procedures completed each year. We have experienced steady program growth due to technique advancement and the increased need for minimally invasive treatment options for patients with symptomatic aortic stenosis.

Historically, TAVR procedures were completed with support from anesthesia for sedation and patient monitoring. In 2020, we began to transition to nurse-administered sedation. The COVID-19 pandemic led to limited anesthesia resources, which risked our ability to care for these patients that had a substantial risk of mortality. We had already begun to consider nurse-led sedation for low risk TAVR patients but didn't yet have buy-in from key stakeholders. We worked with a multidisciplinary team of physicians, coordinators, schedulers, and procedural staff to establish workflows and train nursing staff to provide sedation. We initially started by training a core group of experienced cath lab nurses and have since expanded to train all cath lab nurses to provide procedural sedation during TAVRs. Nurse sedation for TAVRs has allowed our nurses to practice at a higher level of their license, led to improvements in provider-nurse collaboration, and has improved the ability to get patients to procedure faster. This change resulted in improved satisfaction for lab staff, physicians, and patients. We have also seen a marked decrease in overall procedure times, as well as the time needed to turn over rooms, leading to an increase in TAVRs completed, 4-5 per day up from 2-3. The number of TAVR procedures completed with nurse sedation has increased rapidly, starting at just 17% in 2021 to 66% in 2022 and approximately 80% in 2023.

What are some of the new equipment, devices and products recently introduced at your lab?

We are currently working toward introducing transcatheter tricuspid valve repair procedures (tricuspid TEER) and implementing drug-coated coronary balloons. We have increased the use of lithotripsy in coronary arteries, began offering the Piccolo Occluder (Abbott Vascular) for pediatric patients requiring patent ductus arteriosus (PDA) closure, and became involved in the support of the newly introduced pediatric heart transplant program at American Family Children's Hospital. Within the last few years, our cath lab has integrated 4-D intracardiac echocardiography (ICE), coronary lithotripsy, and instantaneous wave free ratio (iFR) into our practice. The UW Health Cath Lab has shown to be adaptable with new products, fluctuating availability, and cost-effective measures. Whenever new technology or equipment is introduced, all staff members receive education as a team.

Where are patients prepped and recovered (post sheath removal)?

Patients are prepped and recovered in the HVPC prep and recovery area. The staffing model has expanded over the last few years due to our increased volume of patients and procedures. We have a core group of prep/recovery staff that includes a care team leader (CTL), RNs, NAs, and a patient scheduling coordinator. In addition to the core prep/recovery staff, our procedural RNs float to the prep/recovery area on a rotational basis. The area is supported by our APPs, who assist with pre-procedure evaluation, consenting patients for procedure and post-procedure care and follow-up if needed. Most of our procedures are accessed through the right radial artery and patients receive a radial compression device for hemostasis. For patients who have had a procedure through the femoral artery or vein, hemostasis is achieved with manual pressure or a closure device (AngioSeal [Terumo Interventional Systems]/Perclose ProGlide [Abbott]/Vascade [Haemonetics]). In the event of closure device failure or hematoma, a FemoStop (Abbott) will be applied to achieve hemostasis. The vast majority of our patients are appropriate for same-day discharge

Figure 3. **Invasive Cardiology Management Team (left to right): Matt Klaren, Invasive Cardiology Tech Supervisor; Holly Studier, Invasive Cardiology Manager; Carole Willis, Invasive Cardiology RN Supervisor.**

after recovery. We have also begun to employ same-day discharge for patients who have undergone LAAO closure, PFO, ASD, or complex percutaneous coronary intervention procedures following a stable procedure and recovery period.

How are you recording fluoroscopy times/dosages?

We use a dose-monitoring software program that records radiation exposure, which is monitored by our assigned medical physicist. Once the dose reaches 3,000 mGy or above, the CVT/RN monitoring the procedure will inform the attending physician during the procedure. If a patient receives over 5,000 mGy during a procedure, the medical physicist will be informed, a form will be filled out, and the patient will be examined by an interventional cardiology provider (APP, fellow, or attending) post procedure with a follow up at one month and six months. If mGy goes above 10,000, our medical physicist is informed immediately to calculate peak skin dose and above 15,000 mGy there is also a notification to risk management. We rarely have procedures that go over 5,000 mGy and have not had exposures over 10,000 or 15,000 mGy in recent years, if ever.

How is inventory managed at your cath lab?

We use Qsight, a web-based automated inventory management system, to keep an accurate record of our inventory. Supplies are stored in the procedure room, on mobile carts, or in a central storage room, and are scanned out by the circulator as they are used. We do targeted cycle counting, monthly reports to monitor for expired and discarded items, and a complete recounting of our inventory once a year. A process for the addition of new products to the lab involves submitting a request for a product, which goes through a formal clinical analysis for approval and contracting. Once approved, the product can be brought in for a trial or stocked permanently. Our procurement department works closely with the invasive cardiology manager to initiate and renew contracts. Our inventory is managed by our invasive cardiology tech supervisor, who oversees par levels in consultation with providers and the invasive cardiology manager. We have a dedicated supply coordinator from our materials management department who helps order supplies and deliver them to the lab from our main central supply area, as well as monitor and order replacements in case of backorders.

Has your cath lab expanded in size and patient volume?

We have plans to construct an additional procedure lab that will be utilized for both interventional cardiology and EP procedures. Our current areas of growth are in three main areas: structural heart, pediatric invasive cardiology, and EP. We are looking to further expand our staff to help support the additional patient volumes and to have a dedicated on-call team for our pediatric patients.

How does your lab communicate information to staff and physicians to stay organized and on top of change?

Our lab leadership team frequently meets with staff to communicate information and share updates. Members of the leadership team round multiple times a day to stay apprised of the flow of the day, help troubleshoot when necessary, and be available and visible to the staff. Meeting minutes and summaries are sent out to staff to ensure everyone has received the necessary information. We also use a centrally located monitor that displays important information — backorders, call team schedule, important dates etc., so staff are able to stay updated on changes if they haven't been able to check their email.

Can you share some data about your lab's door-to-balloon (D2B) times?

We are one of two ST-elevation myocardial infarction (STEMI)-receiving centers in town, and work with the other center to create and share evidence-based STEMI protocols for emergency medical services (EMS) and regional hospitals. Consistent, streamlined, and evidence-based protocols help reduce the risk of error, expedite patient care, and optimize outcomes. We have consistently maintained D2B times in the mid-upper 40-minute range for the last 12 years. We make every effort for field-activated STEMI patients to go directly to the cath lab, unless the patient has factors that warrant further assessment in the emergency department (ED). This has been achieved with the STEMI Patient Readiness Initiative Team (SPRINT) protocol. The SPRINT protocol was implemented in 2011 to help achieve expedited D2B times for STEMI patients. One of the key elements of this protocol is that the patient can be brought to the cath lab when one RN and one physician — who is dedicated to staying for the case — is present. We no longer wait for the entire team to arrive before calling for the patient. This protocol also delineates roles for each team member, so the work is streamlined, efficient, and avoids unnecessary duplication of tasks.

Who transports the STEMI patient to the cath lab during regular and off hours?

STEMI patients present to the cath lab in several ways, depending on how they enter our system. For a patient coming from the field or an outside hospital, they typically present to the cath lab with an ED RN and the paramedic/med flight team. If a patient is presenting to the cath lab from the ED at University Hospital or an inpatient unit, they will present with an ED/inpatient RN. This allows for the cath lab team to prepare for the patient's arrival to expedite the patient's care. This process is the same for both regular and off hours.

What do you do when the call team is already busy doing a procedure and a STEMI comes into the ED?

To accommodate a second emergent case outside our workday, we contact additional staff via text page to request volunteers. It is rare that both STEMI patients are expected at the same time, so we aim for a minimum of two extra team members. The additional staff members get a second room ready and start the next STEMI when there are enough staff to safely start the procedure. If the STEMIs have the same arrival time, our provider will reach out to the other interventional cardiologists to see if any are available to help, and we will request at least three extra staff members.

Is there a particular mix of credentials needed for each call team?

We have a four-person call team that usually consists of two RNs and two CVTs each evening, weekend, and holiday. Occasionally, we will have a different mix of staff members, but require at least one RN to be present for each procedure. We have one interventional cardiologist and may have an

Figure 4. **Heart and Vascular Procedure Center Staff (left to right): Caroline Krolicki, RN; Cara Miller, Operations Process Analyst; Nikki Fein, RN; Amanda Siegal, CVT; Tyler Kupsky, RN; Adam Thompson, RN.**

interventional cardiology fellow on call. We give staff who are post-call priority for coming in late or leaving early during their scheduled shift if possible.

How does your lab schedule team members for call?

Our regular shift and on-call scheduling for both adult and pediatric cath lab is done by the invasive cardiology RN supervisor. Our pediatric team has recently begun being scheduled for on-call duties, which were previously covered by the adult cath lab team. The pediatric team does not have on-call requirements during the week but are scheduled every third weekend due to the low volume of urgent or emergent procedural needs. The pediatric team is always supported by anesthesia so they can be supported by a three-person call team.

Adult cath lab staff are typically scheduled for one night of call during the week and cover every fifth to seventh weekend. We are currently piloting a scheduled weekend call rotation with our RNs, which provides predictable on-call scheduling. We hope to implement this for our CVTs in the future. When scheduling, two RNs and two CVTs are assigned with consideration of skill mix. Typically, a staff member who has taken call for one year or greater is appropriate to be on call with any staff member, while newer staff members are assigned call shifts with more experienced staff. We use a group texting app to request volunteers if there is a need for a second team due to an additional emergent procedure. If the on-call team is finishing a procedure at the end of the business day, we also request volunteers for back-up call to help cover for emergent procedures.

Within what time period are call team members expected to arrive to the lab after being paged?

The adult call team members are expected to be present and ready for procedure within 30 minutes of pager activation for STEMI or other emergent cases. Call team members can park close to our lab while on call, utilize in-hospital on-call rooms, or take advantage of reduced rates at nearby hotels if they live outside of the 30-minute call radius. Our pediatric program on-call requirement is a one-hour response time. All pediatric procedures are done with anesthesia so are usually known about at least several hours ahead of time, but usually a day or two in advance.

Do you have flextime or multiple shifts?

Our lab offers a mix of 8-, 10- and 12-hour shifts with staggered start and end times, typically assigned based on staff preference with consideration for maintaining minimum staffing for operations. Staff also have varying FTE, generally between 0.6-1.0. Our lab offers many opportunities for cross-training in different areas and procedures so staff can be utilized in many areas. For example, cath lab staff receive training to operate independently in EP device placements, so they may have an EP case scheduled in their procedure room. This allows us to get patients to procedure faster and avoid flexing down staff. During downtime, staff are expected to stock rooms, check expiration dates on products, and assist with remaining procedures. Our staff are also encouraged to participate in various quality improvement projects and initiatives, and can use downtime for this purpose.

What measures has your cath lab implemented in order to cut or contain costs?

We maintain close collaboration with our procurement and contracting team, which is excellent at reducing costs with our vendors and suppliers. Whenever feasible, we prioritize obtaining supplies on consignment to mitigate expenses related to maintaining minimum par levels and replacing expired items. Our physicians actively collaborate to minimize variation between equivalent products, thereby reducing waste due to expiration and enhancing our ability to negotiate price reductions. Additionally, we regularly assess our sterile packs to identify and eliminate nonessential items, thereby avoiding waste and unnecessary expenses.

In addition to reducing financial costs, UW Health participates in programs to reduce waste to make our organization more environmentally sustainable. UW Health has been recognized with several national awards for our environmental achievements, including Partner for Change, Greening the OR, Circles of Excellence-Food, and Emerald Award. The Emerald Award recognizes the top 20 percent of applicants, and is focused on advanced sustainability programs and exemplary scores in a range of categories.

What quality control measures are practiced in your cath lab?

Every month, the interventional cardiology department conducts a department-specific morbidity and mortality (M&M) meeting to review and discuss cases that meet inclusion criteria. This is in addition to the M&M meeting held for the overall cardiology department. Our peds and adult congenital department holds weekly case reviews to discuss patient care. All HVPC staff, fellows, residents, APPs, and attending physicians are encouraged to participate in case discussions, share insights on patient outcomes, and engage in learning opportunities. For all programs that participate in national registries, there is a quarterly review to evaluate and guide quality improvement. Following every code in the HVPC, we conduct a formal debriefing

Figure 5. Amish Raval, MD, Medical Director of the UW Health STEMI Program, leading a pre-procedure huddle.

session to recognize successful aspects and identify opportunities for improvement. This structured approach helps us learn from each experience and continuously enhance our processes and outcomes.

How is coding and coding education handled in your lab?

Operations Process Analyst Cara Miller helps to ensure our coding and billing are up to date, and is the go-between for the lab staff, physicians, and the coding department when there are questions. The organization also has professional coding specialists who review our coding, and a department dedicated to reviewing coding and charging practices to ensure proper documentation and compliance.

Who documents medication administration during the case?

The RN providing moderate sedation during the procedure will chart their own medication doses. Medications administered by the interventionalist, contrast doses, and code medication administration are typically documented by the staff member monitoring the case in the control room. The medications given during the procedure are documented in Mac-Lab (GE HealthCare) and occasionally also in HealthLink if they are high risk medications that need to be well documented (eg, clopidogrel, alteplase, etc.) If there is a procedure that includes our anesthesia colleagues, they document all the medications they give in Epic (HealthLink).

Do you use the American College of Cardiology National Cardiovascular Data Registry (ACC-NCDR) or any other outside data collection registry?

We are using the ACC-NCDR for our registries, which is populated by manual data abstraction by analysts in the quality department. Cath lab staff doesn't participate in data abstraction unless there are specific procedural-related questions. We currently participate in the CathPCI, Chest Pain-MI, TVT, LAAO, and IMPACT registries.

How does your cath lab compete for patients? Has your institution formed an alliance with others in the area?

We cover STEMI call for four local hospitals, as well as many surrounding community hospitals. After-hours emergent procedures are only done at our University Hospital site. STEMI Program Manager Amy Shepard has developed workflows to expedite transfer from local facilities, EMS, and community hospitals to ensure patients are getting the care they need in a timely manner. Our physician teams rotate coverage throughout three area hospitals, which allows us to provide high quality care to a high volume of patients in the Madison area. Our lab also performs high acuity procedures that are not offered by other institutions, such as TAVR, Watchman (Boston Scientific), MitraClip (Abbott), and laser lead extractions, resulting in additional patient referrals from outside facilities.

How do you handle vendor visits to your lab?

All industry personnel are required to register with our vendor liaison office and wear badges that signify their status. The vendor representatives must renew their badges each year and a color code for the new year makes it easy see if the badge is current. For the cath lab, we have vendor support for all structural heart procedures, as well as for training or support for other types of procedures or devices. Vendors are only allowed in the cath lab when we request assistance or if they have permission.

How is staff competency evaluated?

During orientation, new staff work with their preceptor to complete competencies on different procedures and devices. Annually, we complete a department-specific, staff-driven competency to refresh our education. The topic is picked by our unit council members based on clinical concern, and/or high risk procedure or activity. The competency evaluation tool is created by department leadership along with our nursing education specialist and clinical nurse specialist. In the past, we have done competencies on neuro assessments, sterile technique, and inventory management, among other topics. Each month, we provide in-services and mini education sessions presented by device superusers, vendors, or fellow/attending physicians to maintain staff competency. We track each staff member's participation in these sessions to ensure they remain up to date, especially on rarely used equipment.

What continuing education opportunities are provided to staff members?

On a monthly basis, we have a minimum of one EP-focused and one interventional cardiology-focused in-service or educational session. We coordinate with vendors and physicians to lead these sessions, and seek staff feedback about topics that would be beneficial. We offer in-person and virtual accommodation for these sessions, and will record them for staff to review later if they are unable to attend in real time. CMEs can be earned at our monthly interventional cardiology M&M and nursing grand rounds, as well as at our weekly cardiovascular medicine grand rounds and pediatric adult congenital case conference. There are also CMEs available online through our education portal. The organization offers many resources for staff, including classroom lectures, skill labs, and computer-based learning modules, on a variety of topics.

What works well for your lab in onboarding new team members?

We have a preceptor-based orientation where new staff members are scheduled with one or two main preceptors. We have developed a staged orientation plan for new staff and their preceptors to follow, which allows staff to build upon their skills and experiences to progress toward more complex cases. Our orientation typically runs four to six months, and we have monthly check-ins with new staff and their preceptors to discuss their experiences, determine goals for the next month, and to address any concerns. UW Health also provides courses and online resources tailored to support experienced staff members who are transitioning into precepting roles, helping them strengthen their precepting skills.

Do you require your clinical staff members to take the registry exam for the RCIS credential?

We do not require our clinical staff members to take the RCIS exam unless they are seeking a senior CVT position. We do encourage our CVT staff to take the RCIS exam, and our RNs to seek relevant certifications for their positions in the cath lab or the prep/recovery area. Staff who obtain and maintain advanced certifications are eligible to receive a yearly certification bonus.

Does your lab have any physical layout bottlenecks or limitations? How do you work around the resulting challenges?

One challenge our lab faces is limited physical space to expand. We are in the center of the hospital and surrounded by the OR, post-anesthesia care unit (PACU), and administrative space, which limits available space to construct additional labs. This limitation requires our team of CTLs, clinical program coordinators, scheduling coordinators, and supervisors to work collaboratively to closely monitor and optimize our resources to meet the needs of the patients and department.

What do you enjoy about your department's physical space?

We benefit from having most of our labs in the same physical space, with the exception of the pediatric hybrid lab. This allows us to complete our structural heart procedures in the same department, have a short distance to transfer patients between prep/recovery and their procedure, and avoids staff going to different areas of the hospital for specialty procedures. It also allows staff members to be readily available to help in multiple areas and aids in building rapport between programs. University Hospital is also connected via a skybridge to the American Family Children's Hospital, which makes it easy for staff to go between the adult and pediatric cath labs.

Do staff members have any little or big particular perks that you might like to share?

Coming in late or leaving early is supported if there is a late night or early morning call. We ask that if staff are coming in late, they indicate their estimated arrival time so we can plan the day, and also release staff as soon as possible if they prefer to leave early. UW Health allows for hours worked over an employee's FTE to be converted into compensatory time, which can be used later for time off, appointments, or sick days. Depending on each department's situation, incentives may be offered to encourage staff to pick up vacant shifts.

Our organization offers generous compensation and benefit packages for staff members. Scholarships and tuition assistance or reimbursement are available to staff members pursuing additional education or participating in conferences or trainings. UW Health employees also qualify for corporate discounts and have access to some University of Wisconsin facilities.

Has your lab recently undergone a national accrediting agency inspection?

Our most recent survey activity was our Laboratory Services Accreditation survey conducted by The Joint Commission in December 2023. We are currently in The Joint Commission window for the full survey of our hospitals, clinics, and home care. We typically see the time-out process observed during surveys but there seems to be a new area of focus with each visit. We work closely with our nursing education specialist and clinical nurse specialist to ensure we are up to date with staff competencies and practice guidelines. Our leadership team and quality department help to ensure we stay on top of other regulatory requirements through quarterly safety rounds. Safety rounds consist of a team of multidisciplinary staff, including infection prevention, pharmacy, security, environmental services, and others to assess for potential safety issues and survey readiness, and to identify areas for improvement regarding the physical condition of our department.

Figure 6. Ashley McCullough, RN, prepares a manifold with Joe Gissing, RN.

In June 2023, University Hospital underwent a survey for Magnet status redesignation, which we received for the fourth time. The Magnet site visits are always less stressful than The Joint Commission, and focus on what we do well as it relates to shared governance and nursing practice. We leverage the expertise of a Magnet Champion to keep a list of completed projects, and document the ongoing enhancements made to our practices and quality over the years. This portfolio serves as a testament to our improvement efforts and provides valuable insights to share with the surveyor.

What trends have you seen in your procedures and/or patient population?

We have seen an increase in procedural volumes across all areas, as well as an increase in the complexity of the patients we treat. Each year, we are doing more procedures with support devices. Our structural heart program volume has steadily increased and we have seen more patients with less severe disease elect for our minimally invasive procedures. We are adding endovascular tricuspid repair to our structural heart program. We have seen substantial growth in our pediatric invasive cardiology program, especially since introducing the Piccolo PDA Occluder and with the inception of our pediatric heart transplant program.

What is unique or innovative about your cath lab and staff?

Our lab places a strong emphasis on shared governance, facilitated by a unit council. Composed of a diverse group of RNs and technologists from our various programs, this council collaborates to ensure collective decision-making and representation across all areas of our lab. Since we differ so greatly from other inpatient and outpatient areas, we can create and tailor our guidelines and practices to best support our department, while focusing on input from our frontline staff. We have done several quality improvement projects with our unit council to improve communication and workflows in our department, increase staff satisfaction, and maintain a positive workplace environment. Our most recent projects include an alternative way to schedule RN call weekends and department-specific behavioral guidelines based on our organizational Respect for People initiative.

Our cath lab leadership team has also worked with our next-level leaders to establish new positions such as operations process analyst, clinical program coordinators, CVT-senior for pediatrics, and invasive cardiology tech supervisor. These positions help support our lab and offer advancement opportunities for cath lab staff.

The operations process analyst position was added to assist with communication between the coding and charge integrity teams and the clinical team, and to assist with application and equipment troubleshooting, service coordination, data coordination, and construction planning. This position was an opportunity for our CVT staff to continue to support the lab without on-call responsibilities and offered the ability to work partially remotely.

Our lab has had a significant challenge coordinating limited resources for procedures that require multiple specialties (eg, echo vascular, anesthesia, cardiothoracic surgery, etc.) We added the clinical program coordinator role to help with triage and coordination between programs to effectively utilize all our resources without adding staff clinical hours. This role has helped create continuity and

Figure 7. Nicole Rutledge, CVT, monitoring a patient procedure.

consistency in how procedures are scheduled. As a result, we have been able to increase our procedure volume significantly without adding resources.

Introducing the invasive cardiology tech supervisor role aligned staff with their next level leader, which has improved communication and coordination within the team. Additionally, implementing the CVT-Sr position in the pediatric cath/EP lab was a strategic move to enhance support for our expanding pediatric invasive cardiology program. This position addressed the growing needs of the program and also offered career advancement opportunities for our technologist staff. By creating these positions, we increased promotional opportunities, and ensured consistency and expertise within the team, which are crucial for maintaining a high-functioning team and providing top-level care.

Is there a problem or challenge your lab has faced?

The UW Health Cath Lab team is a high-functioning group of exceptional healthcare providers who care for patients with complex procedural needs. In 2022, there was a significant staffing challenge, especially with our CVT staff, that threatened the ability to care for our community and was a significant strain to the team who remained. In a short span of time, we lost six CVTs, four RNs and our RN supervisor. Five staff members moved out of the area, five left to travel, and one left for improved work-life balance. CVTs have been traditionally difficult to recruit and our lab has frequently used travelers for vacancies and leaves of absence. At that time, traveler staff were also difficult to recruit.

Our upper-level leadership team, physician team, and human resources team were very responsive to our situation. They helped retain the remaining core staff and supported ideas from frontline team members to make it through the staffing crisis. Before the critical staffing challenge, CVTs were the only team members who monitored procedures and very few RNs scrubbed. Team members from each program (prep/recovery, pediatrics, EP, and cath) were extremely flexible and helped in any way they could to get through the most challenging days. This was exceptionally stressful for all, but amazing to witness the teamwork happen. It made our team more collaborative and cohesive, which improved our lab for the better.

A small group of volunteer RNs were trained to scrub and monitor procedures. This was made possible using additional RN traveler staff who were easier to recruit than CVT travelers at that time. Training our experienced RNs for the monitor and scrub roles was beneficial in two ways. First, it alleviated strain on our core CVT staff who were already stretched thin, as the RNs brought prior lab experience. Second, it fostered enhanced collaboration and mutual appreciation between the two groups.

In addition to training staff to do other roles, the critical staffing situation led to additional expedited innovation. We created new positions to help support the lab, including operations process analyst, clinical program coordinator, and invasive cardiology tech supervisor. These positions helped offload other positions that were overstretched, led to consistency with communication, and provided opportunities for our tech staff outside direct patient care.

We also collaborated with the UW Health Allied Health Education and Career Pathways Department to begin a formal CVT apprenticeship program and onboarded a CVT apprenticeship program manager to support the initiative. This department was established to proactively address work shortages and build paid learning pathways for allied health careers. The mission of our Cardiovascular Technology Apprenticeship Program is to educate apprentices in the art and science of invasive cardiovascular technology, and to prepare competent entry-level cardiovascular technologists in the cognitive, psychomotor, and affective learning domains. Under the direction of Program Manager Aimee Hernandez, BS, RCIS, clinical and didactic education is coordinated and provided in a 36-week program to support apprentices in their growth in knowledge and skills, and as individuals, as they progress toward a career as a cardiovascular technologist. The program currently accepts applicants who are graduates of JRC-ERT (CHEA)-accredited radiologic technology degree programs, but will expand next year to include graduates of additional accredited allied health degree programs. Upon completion of the program, apprentices are hired as cardiovascular technologists in the UW Health Cath Lab, with a two-year commitment of employment. In our first year, we had one apprentice and two apprentices completed the program on June 14, 2024. The next cohort of three apprentices has been hired and began the program August 19, 2024.

What's special about your city or general regional area in comparison to the rest of the U.S.?

University Hospital is located in Madison, Wisconsin (Dane County), in the south central part of the state. In 2021, the population of Dane County was around 565,000, with roughly 270,000 in Madison. Even though Wisconsin weather can be temperamental, Madison offers an abundance of both indoor and outdoor activities. The downtown has many restaurants, theaters and music venues, the Capitol Square, and is also home to the University of Wisconsin-Madison. In the spring and summer, many Madison residents enjoy visiting the Dane County Farmer's Market, Art Fair on the Square, Olbrich Gardens, Taste of Madison, and Brat Fest. Madison also has many parks, state walking and biking trails, and is situated between Lakes Mendota and Monona, which offer numerous water activities. Fall and winter are filled with UW Badgers sporting events, corn mazes, haunted houses, and winter activities such as snowshoeing, skiing, and sledding. The surrounding area offers numerous suburban communities for those who do not wish to live in Madison proper. Milwaukee, Wisconsin Dells, Green Bay, Door County, Lake Geneva, and Chicago are all within a few hours of Madison for weekend getaways. ■

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