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SCAI/ACVP expert consensus statement on cardiovascular catheterization laboratory economics: If the cath lab is your home you should understand its finances

This statement was endorsed by the Alliance of Cardiovascular Professionals (ACVP) in April 2019

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Abstract

This article is intended for any physician, administrator, or cardiovascular catheterization laboratory (CCL) staff member who desires a fundamental understanding of finances and economics of CCLs in the United States. The authors' goal is to illuminate general economic principles of CCL operations and provide details that can be used immediately by CCL leaders. Any article on economics in medicine should start by acknowledging the primacy of the principles of medical ethics. While physicians have been trained to act in the best interests of their patients and avoid actions that would harm patients it is vitally important that all professionals in the CCL focus on patients' needs. Caregivers both at the bedside and in the office must consider how their actions will affect not only the patient they are treating at the time, but others as well. If the best interests of a patient were to conflict with any recommendation in this article, the former should prevail.

Key Points

- To be successful and financially viable under current payment systems, CCL physicians, and managers must optimize the outcomes and efficiency of care by aligning CCL leadership, strategy, organization, processes, personnel, and culture.
- Optimizing a CCL's operating margin (profitability) requires maximizing revenues and minimizing expenses. CCL managers often focus on expense reduction; they should also pay attention to revenue generation.
- Expense reduction depends on efficiency (on-time starts, short turn-over time, smooth day-to-day schedules), identifying cost-effective materials, and negotiating their price downward.
- Revenue optimization requires accurate documentation and coding of procedures, comorbidities, and complications. In fee-for-service and bundled payment reimbursement systems, higher volumes of procedures yield higher revenues.
- New procedures that improve patient care but are expensive can usually be justified by negotiating with vendors for lower prices and including the “halo effect” of collateral services that accompany the new procedure.

- Fiscal considerations should never eclipse quality concerns. High quality CCL care that prevents complications, increases efficiency, reduces waste, and eliminates unnecessary procedures represents a win for patients, physicians, and CCL administrators.

1 THE CCL BUDGET

Cardiovascular catheterization laboratory (CCL) budgets are divided into revenue and expenses.**1**

1.1 Revenue and payment

1.1.1 Medicare CCL Hospital payment policy (Medicare part A)

Center for Medicare and Medicaid Services (CMS) reimbursement to hospitals is based on the inpatient prospective payment system (IPPS) medicare severity-diagnosis related group (MS-DRG) for inpatients and on the outpatient prospective payment system (OPPS) ambulatory payment classifications (APCs) for outpatients. Payments to a hospital for a given procedure are higher when the patient has inpatient status compared to a patient with outpatient status, but payments to physicians are the same for both (Table 1). CMS reimbursements for inpatients are higher for a patient with a major comorbidity or complication (MCC) than for a patient without an MCC (Tables 1 and 2).

Table 1. Ambulatory payment classifications and medicare severity-diagnosis related groups (MS-DRG) for diagnostic catheterization and coronary intervention procedures. Relative value unit (RVU) and payment data are for 2019

CPT code	Procedure	Work RVU	Total RVU [a]	APC number	APC payment	MS-DRG number	MS-DRG payment
93450-93461	Diagnostic Catheterization (with or w/o FFR)	2.47-7.85	3.79-12.11	5191	$2,810	Does not have a separate MS-DRG	Does not have a separate MS-DRG
92920	Coronary balloon angioplasty	9.85	15.49	5192	$4,679	250 (with MCC)	$15,803
						251 (w/o MCC)	$10,250
92924	Coronary Atherectomy	11.74	18.48	5193	$9,669	250 (with MCC)	$15,803
						251 (w/o MCC)	$10,250
92928	Coronary stenting (bare metal stent)	10.96	17.24	5193	$9,669	248 (with MCC)	$19,382
						249 (w/o MCC)	$12,158
92928	Coronary stenting (drug-eluting stent)	10.96	17.24	5193	$9,669	246 (with MCC)	$19,787
						247 (w/o MCC)	$12,690
92933	Atherectomy + stenting (bare metal stent)	12.29	19.34	5194	$15,355	248 (with MCC)	$19,382

Abbreviations: RVU, relative value unit; APC, ambulatory payment classification; MS-DRG, diagnosis-related group; PCI, percutaneous coronary intervention; MCC, major complication or co-morbidity; FFR, fractional flow reserve.

[a] Total RVUs include physician work RVUs, practice expense RVUs, and professional liability insurance RVUs.

Table 2. Partial list of codes relevant to interventional cardiology that are defined as a major complication or comorbidity (MCC), when used as a secondary diagnosis, from the ICD-10-CM/PCS MS-DRGv28 definitions manual

Diagnosis code	Description
I2101-I213	ST elevation myocardial infarction (STEMI)
I214	Non-ST elevation (NSTEMI) myocardial infarction (NSTEMI)
I220-I2209	Subsequent ST elevation MI (STEMI)
I234	Rupture of chordae tendineae as current complication following acute MI
I235	Rupture of papillary muscle as current complication following acute MI
I2542	Coronary artery dissection
I468-469	Cardiac arrest
I4901-4901	Ventricular fibrillation/flutter
I5021, I5023	Acute systolic heart failure
I5031, I5033	Acute diastolic heart failure
I5041, I5043	Acute systolic and diastolic heart failure
I6310-I6349	Cerebral infarction due to embolism
I7772	Dissection of iliac artery
J810	Acute pulmonary edema
J9582	Post-procedural respiratory failure

Note: Complications of cardiac procedures not listed in this table are not considered "Major Complications or Co-Morbidities" under the ICD-10 system.

Source: **https://www.cms.gov/icd10manual/fullcode_cms/p0031.html** accessed February 1, 2019.

For inpatients, the hospital is reimbursed under the MS-DRG system for the entire hospitalization; there is no separate allocation of funds to the CCL. When hospital-based CCLs treat outpatients, reimbursement is made under the OPPS APC system and is more easily attributable to the CCL.

1.1.2 Inpatient, outpatient, and observation status

In 2013, CMS issued the "two-midnight rule" to clarify which patients are considered inpatients. This rule stated that patients "expected" to stay for two nights or longer by the treating physician are to be considered inpatients. When an acute coronary syndrome is managed with urgent PCI and a one-night hospital stay, the patient may still qualify for inpatient status based on the judgment of the physician, if CMS reviewers consider supporting documentation to be sufficient. Patients not meeting requirements for inpatient designation are considered outpatients and reimbursed under the OPPS APC system.

Observation status is typically ordered for individuals who present to the emergency department and who then require a period of treatment and monitoring to determine whether or not their condition warrants inpatient admission or discharge.**2** Payment for observation is based on Comprehensive APC 8011, valued at $2,387 in 2019, which is much less than the reimbursement for either inpatient or outpatient PCI. Unstable chest pain patients initially placed in observation who then undergo coronary intervention are usually converted to inpatient status.

1.1.3 Physician payment systems (Medicare part B)

Provider payment systems include fee for service (FFS), bundled payment, capitated payments, and recently introduced quality-based payment systems (Table 3). Physician payment is not a part of CCL budgets, but it may affect CCL revenues by encouraging or discouraging physicians from performing invasive procedures.

Table 3. Payment systems for physician services

	Description	Comment
Fee for service	Payment for each individual service rendered	Simplest payment model
Bundled payment	Reimbursement of all healthcare providers (physicians and hospitals on the basis of expected costs for clinically defined episodes of care)	While bundled payments would not necessarily have any direct impact on procedural volume, it would discourage use of unnecessary services during the same procedure.
Capitated payment	Primary care providers paid a fixed amount for every patient assigned to them within a given timeframe	This model may avoid potentially unnecessary procedures but also lead to underutilization of indicated procedures.
Medicare access and CHIP reauthorization act of 2015 (MACRA) merit-based incentive payment system (MIPS) and advanced alternative payment models (APMs).	Payments tied to quality and cost-efficient care	Interventional cardiology as a leader in evidence driven outcomes based practice, would presumably be rewarded in outcomes based payment model but the exact economic impact has still yet to be determined.

Fee for service

Fee for service systems pay health care providers and CCLs directly for services rendered. The more procedures a physician or CCL does, the more they are reimbursed, which offers incentives for performing more procedures. Payers are transitioning away from FFS reimbursement.

Bundled payment

Bundled Payment places more emphasis on value and risk sharing. Unlike FFS, a bundled payment pays for an episode of care. Under CMS' new bundled payments for care improvement (BPCI) initiative, organizations enter into payment arrangements that include financial and performance accountability for episodes of care that include post-hospital care, usually for 90 days. These models are designed to encourage quality and coordinated care at a lower cost. CMS' two BPCI projects involving coronary intervention, implemented in 2013 with voluntary participation by hospitals, are for acute myocardial infarction and for PCI.

Capitation

Capitation is a performance-based payment system in which healthcare service providers, usually primary care providers, are paid for every patient assigned to them but are at financial risk based on tests and services they order for their patients. Quality is incented by monitoring quality metrics. Efficient low-cost care is rewarded by greater revenue to the provider. Incentives to minimize cost of care might decrease referrals for sub-specialty care, especially for high-cost CCL services.

1.1.4 Merit based incentive payments system and alternative payment models

The Medicare access and CHIP reauthorization act of 2015 (MACRA) introduced a new Medicare physician payment system called the quality payment program (QPP). The program offers two tracks for eligible clinicians to receive Medicare payment adjustments under a value-based payment system: the merit-based incentive payment system (MIPS) and advanced alternative payment models (APMs).

The MIPS initiative ties Medicare Part B physician payments to quality and cost-efficient care. Clinicians' performance is measured through data reported in four areas - Quality, Improvement Activities, Advancing Care Information, and Cost. Based on a MIPS composite score, providers will be eligible for adjustments to their baseline Medicare Part B payment of up to −9 to +9% by 2022.

Advanced APMs include bundled payment programs and accountable care organizations with negotiated CMS payments that include “more than nominal risk” of reduced payments for providers who provide cost-inefficient care. Providers who achieve threshold levels of patients or payments through Advanced APMs become a Qualifying APM Participant and receive lump sum CMS bonus payments up to 5% annually from 2019 to 2024.

1.1.5 Coding for CCL procedures

Professional and technical components of CCL services must be reported accurately to optimize CCL revenues (Table 4).

Table 4. Coding systems

Acronym	Entity	Function

Acronym	Entity	Function
CPT	Current procedural terminology	Codes used to document services (evaluation and management [E&M] and procedures) provided by health care professional or entity Category I: Typical services or procedures Category II: Supplemental tracking codes that can be used for performance measurement. Category III: Emerging technology
MS-DRG	Medicare severity-diagnosis related group	Classification system that groups similar clinical conditions (diagnoses) and the procedures furnished by the hospital during the stay. Used to determine payment under the hospital inpatient prospective payment system (HIPPS)
HCPCS	Healthcare common procedure coding system	Codes used to document evaluation and management services and procedures provided by health care professional or entity Level I: The CPT codes Level II: Standardized coding system used primarily to identify products, supplies, and services not included in the CPT codes, such as ambulance services and durable medical equipment, prosthetics, orthotics, and supplies (DMEPOS) when used outside a physician's office

Current procedural terminology codes

Current Procedural Terminology (CPT) codes are used by the physician to report professional services (Tables 6 and 7). Accurate reporting of CPT codes is also essential for the CCL since they determine which DRG or APC classification will be used to reimburse the facility. CMS' national payment policies dictate reimbursement, and some CPT codes are not reimbursed by CMS. For some of these codes, local Medicare carriers will issue local coverage decisions that provide coverage.

MS-DRG payments

MS-DRG payments to a facility cover costs of providing services to Medicare patients. A patient's MS-DRG is determined by (a) the principal International Classification of Diseases-10 (ICD-10) diagnosis and up to 24 secondary ICD-10 diagnoses including comorbidities or complications, (b) up to 25 procedures furnished during the stay, and (c) a patient's gender, age, or discharge status disposition. MS-DRGs bundle all services and supplies provided during the inpatient admission. MS-DRG reimbursement for an individual patient is not affected by length of stay, intensity of treatments, or number of procedures performed, except for extreme outlier cases.

CCLs typically have CCL staff enter codes or charges for each procedure, and hospital coding experts later convert these to billing codes. Accurate documentation is critical for this process. For example, an inpatient treated with a drug eluting stent maps to MS-DRG 247 with 2019 reimbursement of $12,690. However, documentation of >/= 4 stents used in the procedure or of a major complication or comorbidity (MCC) would shift the MS-DRG assignment to MS-DRG 246 with a 50% increase in

reimbursement. CCL staff should therefore work carefully with hospital coding specialists to ensure proper reporting of patient comorbidities.

Facility reimbursement under Medicare for *outpatient* procedures is determined by the APC. The level II HCPCS codes are assigned to APCs based on similar clinical characteristics and similar costs. All services within an APC receive the same payment rate.

1.1.6 The resource-based relative value system (Medicare part B)

The Omnibus Budget and Reconciliation Act (OBRA) of 1989 required CMS to implement the resource-based relative value system (RBRVS) with relative value units (RVUs) for physician work and for physician practice expense for each service CMS covers. The value of an RVU, termed the "conversion factor," is $36.04 for 2019 and varies little from year to year.

For procedures performed in a hospital, CMS reimburses the physician for the estimated cost of operating the physician's office while the physician is providing the service at the hospital. For procedures in a freestanding facility owned by the physician, CMS reimburses for the estimated cost to the physician for operating the facility during the procedure.

CMS regularly updates RVU values based on reviews by the American Medical Association/Specialty Society Relative Value Update Committee (RUC), which over the past decade has recommended new values for almost every code performed in CCLs (Tables 5 and 6).

Table 5. Relative value units (RVUs)s for adult cardiac catheterization codes in 2019

CPT code	Descriptor	Work RVU	Non-facility practice expense RVU	Facility practice expense RVU	Professional liability insurance RVU	Total non-facility RVUs	Total Facillity RVUs
Adult catheterization codes—Free-standing cardiac catheterization laboratories							
93452	[a]Left heart cath	4.50	19.22	1.56	0.88	24.60	NA
93453	[a]Left and right heart cath	5.99	24.69	2.09	1.24	31.92	NA
93454	Coronary angiography	4.54	19.38	1.57	0.93	24.87	NA
93455	Coronary and graft angiography	5.29	22.26	1.82	1.09	28.64	NA
93456	Right heart cath and coronary angiography	5.90	24.37	2.04	1.20	31.47	NA
93457	Right heart cath and graft angiography	6.64	27.18	2.28	1.36	35.18	NA
93458	[a]Left heart cath and coronary angiography	5.60	22.74	1.93	1.16	29.50	NA

CPT code	Descriptor	Work	Non-facility	Facility	Professional	Total	Total

[a] Left heart catheterization RVUs are the same with versus without left ventriculography. The −26 modifier is used when the procedure is performed in a facility (i.e., hospital) and practice expense consists of costs of running an office. When the codes is used without the −26 modifier, reimbursement includes practice expense of providing the entire service in a physician-owned facility.

Abbreviation: RVU, relative value unit.

Table 6. Relative value units (RVUs) for adult structural intervention codes for 2019

CPT code	Descriptor	Work RVU	Non-facility practice expense RVU	Facility practice expense RVU	Professional liability insurance RVU	Total non-facility RVUs	Total facility RVUs
Trans-catheter aortic valve replacement (TAVR)							
33361	TAVR, percutaneous femoral access	25.13	NA	8.51	5.84	NA	39.48
33362	TAVR, open femoral access	27.52	NA	9.17	6.41	NA	43.10
33363	TAVR, open axillary access	28.50	NA	9.46	6.68	NA	44.66
33364	TAVR, open iliac access	30.00	NA	10.06	7.08	NA	46.14
33365	TAVR, median sternotomy	33.12	NA	10.95	7.76	NA	51.83
33366	TAVR, trans-apical	35.88	NA	11.76	8.39	NA	56.03
Transcatheter mitral valve repair (TMVR)							
33418	TMVR, initial	32.25	NA	12.86	7.28	NA	52.39

Note: Non-facility RVUs are not assigned because these procedures are only performed in a facility (i.e., inpatient hospital).

Abbreviations: TAVR, transcutaneous aortic valve replacement; TMVR, transcutaneous mitral valve replacement; PVL, peri-valvular leak.

1.2 Expenses

CCL expenses discussed here are costs, not charges. They can be divided into those which vary depending on the number of procedures done ("variable expenses"), and those which are independent of the number of procedures done ("fixed expenses") (Table 7).

Table 7. Examples of types of cardiovascular catheterization laboratory expenses

Direct costs (directly attributable to the cardiac catheterization laboratory)
Direct variable costs (variable depending on number of procedures done)
Disposable equipment used during procedure
Salary for overtime/off-hours cases
Electricity used to operate the fluoroscopy imaging chain
Direct fixed costs (independent of number of procedures done)
Salary of cardiac catheterization laboratory administration
Salary of cardiac catheterization laboratory staff (non-overtime)
Depreciation of cardiac catheterization laboratory equipment
Environmental services (housekeeping)
Indirect fixed costs
Salaries of hospital C-suite administrators
Rent for physical space in hospital where cardiac catheterization laboratory is located
Overhead costs of running medical center (security, non-patient care departments, etc)
Share of institutional debt

Fixed direct expenses

Fixed direct expenses do not vary with the number of procedures done and they are directly attributable to the CCL. These include salary of the CCL operations manager and environmental services workers, cost of maintenance of the CCL, and cost of capital equipment (e.g., balloon pump consoles or CCL imaging equipment) which may be distributed over time as depreciation.

Fixed indirect expenses

Fixed indirect expenses are not directly attributable to the CCL, such as the salary of the hospital C-suite leaders, maintenance of hospital grounds, or interest on institutional debt. These expenses are distributed across all units in the hospital, and hospital accountants assign the CCL a specific share.

Variable expenses

Variable expenses vary with the number of procedures done, and often are directly attributable to each procedure. Examples include disposable materials (e.g., drapes, syringes), devices (e.g., stents, mechanical support devices), and drugs (e.g., bivalirudin) used for a particular patient (Table 9).

Some expenses have both fixed and variable aspects. For example, if three CCL staff are assigned to the CCL every day regardless of whether one or six cases are done, their salary is a fixed expense for the CCL. However, if technologists are paid overtime for seven or more cases for the day (or if a

second shift of technologists is hired), the additional salary adds a variable component to the CCL's expenses.

1.3 Operating margin

The difference between CCL revenues and expenses is the operating margin (i.e., profitability). CCL revenues for inpatient procedures are difficult to quantify since reimbursement is by a MS-DRG payment for the entire inpatient stay. Outpatient APC payment for a procedure may be used as a surrogate to estimate reimbursement for inpatient procedures. Expenses include the variable expenses and fixed expenses discussed above (including depreciation and amortization), some of which are estimated. Thus, calculation of operating margin depends a great deal on assumptions and estimations. However, the operating margin of a busy, efficient CCL is usually exceptionally favorable. Operating margins rarely appear in CCL budgets, perhaps because they require extensive estimation, or because they might divert physicians' attention from the imperative to cut CCL expenses.

CCL leaders and administrators may encounter the term “EBITDA,” an acronym for “earnings before interest, taxes, depreciation, and amortization”. This is an accounting metric calculated by adding depreciation and amortization back into operating margin, then subtracting the CCL's share of institutional taxes, and interest on debt. EBITDA is seldom applied to CCL financial considerations.”

When evaluating the financial aspects of different programs (e.g., structural, peripheral, and coronary), it may be useful to identify revenues, expenses, and operating margins for each.

2 ECONOMICS OF NEW PROCEDURES: HOW TO MAKE THEM AT LEAST BREAK EVEN

2.1 How payments for new procedures are developed

A new procedure receives a CPT code through the American Medical Association CPT Editorial Panel. This process typically begins with specialty societies submitting a code proposal to the Panel. New procedural codes often begin as Category III codes for emerging technology, which are tracked but not reimbursed by CMS on a national level, although local Medicare carriers may provide coverage. If such a procedure becomes frequently performed, specialty societies apply to the Panel to convert it to a category I code.

Next, the specialty societies (e.g., the American College of Cardiology and the Society for Cardiovascular Angiography and Interventions) survey providers regarding the time and effort required to perform the service. Survey results are reported to the AMA/specialty society relative value update committee (RUC). Based on survey results and the specialty societies' recommendations, the RUC recommends RVU values for physician work and practice expense to CMS. CMS either accepts the RUC recommendation, uses internal processes to develop its own values, or makes a payment policy decision to not reimburse for the procedure. In some cases, CMS makes a National Coverage Determination, which sets conditions on payment for procedures. CMS publishes its final decisions in the late fall of every year as part of the medicare physician payment schedule in the code of the federal register final rule.

Finally, CMS determines if a new procedure should be assigned to an existing MS-DRG or APC, or whether it is different enough to require a new, unique MS-DRG or APC. In the latter case CMS

develops and values a new MS-DRG or APC (Table 8).

Table 8. CMS relative value units and reimbursements for new structural interventional procedures in 2019

Procedure	CPT code	Work RVUs	Total facility RVUs	Average professional fees	DRG (w/ and w/o MCC	DRG payment (w/ and w/o MCC
Left atrial appendage occlusion	33340	14.00	23.01	$829.26	273/274	$22,314/$18,195
Transcutaneous aortic valve replacement	33361	25.13	39.48	$1,422.82	266/267	$43,935/$35,727
Transcutaneous mitral valve repair	33418	32.25	52.39	$1888.09	228/229	$40,176/$28,398

2.2 Specific new technologies payments

New cardiovascular technologies are financially challenging for CCLs. Structural procedures such as trans-catheter aortic valve replacement (TAVR), percutaneous left atrial appendage occlusion (LAAO), and transcatheter mitral valve replacement (TMVR) require expensive implantable devices. Total reimbursement may not even cover the cost of the device to the hospital. Table 9 shows financial modeling from a tertiary care center considering whether to start a left atrial appendage occlusion program. The model suggested that the program would roughly break even, with length of stay after the procedure determining whether the program would generate profits or losses.

Table 9. Pro forma for watchman procedure revenue/cost impact

	Vendor total [a]	MS-DRG 222, 224–225, and 242–244 prorated to 48 cases, length of stay 2 days	MS-DRG 222, 224–225, and 242–244 prorated to 48 cases, length of stay 2 days	MS-DRG 222, 224–225, and 242–244 prorated to 48 cases, length of stay 3 days	MS-DRG 222, 224–225, and 242–244 prorated to 48 cases, length of stay 3 days
Annual watchman implants [b]	48	48	1	48	1
Average length of stay	1.3	2	2	3	3
Annual procedure reimbursement	$1,212,729	$1,123,008	$23,396	$1,123,008	$23,396

	Vendor total	MS-DRG 222, 224–225, and 242–244 prorated to 48 cases, length of stay 2 days	MS-DRG 222, 224–225, and 242–244 prorated to 48 cases, length of stay 2 days	MS-DRG 222, 224–225, and 242–244 prorated to 48 cases, length of stay 3 days	MS-DRG 222, 224–225, and 242–244 prorated to 48 cases, length of stay 3 days

Abbreviation: MS-DRG, medicare severity-diagnosis related group.

[a] data supplied by vendor—usually much more optimistic than estimates developed by the institution.

[b] estimate of 48 cases per year is optimistic and is based on requirement to obtain the rebate. Note that if actual volume was <48/year then the hospital would not receive the rebate and the program would lose about $124,000 even with a two-day length of stay.

This pro forma did not include revenue that would be expected from the "halo" or downstream effect (services for patients referred for the procedure but not receiving it, and services performed as part of the workup before and after the procedure). When building a business plan for a new procedure under fee for service reimbursement systems, it is important to consider the halo effect. However, some chief financial officers put little credence in the halo effect, it is irrelevant under capitated or bundled payments systems, and fee-for-service revenues resulting from halo effect services may decrease as technology matures.

Requirements for performing TMVR, TAVR, and LAAO are specified in Medicare's National Coverage Determinations. Failure to meet these requirements will lead to nonpayment by CMS. Nonpayment for even a few procedures will have severe consequences to CCL operating margins. It is important for CCL leaders to be aware when CMS issues new national coverage determinations or payment policies.

Documentation and coding of major complications or comorbidities is critical since their presence adds nearly $5,000 to reimbursement for LAAO, almost $10,000 for TAVR, and almost $30,000 for TMVR.

2.3 Medicare reimbursement to providers

Reimbursement for new procedures may be marginal not only for CCLs, but also for providers (Table 8). Surgeons may find time spent assisting with structural procedures to be far less remunerative than time spent operating. Echocardiographers are reimbursed with the structural echo CPT code (CPT 93355), valued at only 4.66 RVUs (about $160) for an estimated 2 hr and 40 min of work. Interventionalists are not reimbursed by payers for training or for developing structural intervention programs. These factors may limit physicians' enthusiasm for new CCL procedures.

3 STRATEGIES FOR SURVIVING AND THRIVING IN THE ERA OF HEALTH REFORM

3.1 Maximizing revenue in fee for service reimbursement systems

Regardless of which payment system is reimbursing for services, any provider of services must ensure that what is owed is collected. For the CCL, the "realization rate" can be defined as the ratio of what is

owed by payers, to what is collected. Optimizing this ratio is the responsibility of CCL operations managers and depends on appropriate coding of services, patient morbidities, and equipment; timely submission of accurate claims; re-submission when claims are inappropriately denied; and efficient collection strategies.

Documentation

Documentation is critical to the financial health of CCLs. Coding of procedures and the equipment used during a procedure will determine to which MS-DRG or APC the patient is assigned, and whether the patient meets criteria for MCC status. As noted above, neglecting to mention that a stent was drug-eluting, or that four stents were used, can result in mis-assignment of patient DRGs or APCs that diminish reimbursement by many thousands of dollars.

Accurate reporting of patients' co-morbidities is also important for reimbursement to institutions. Comorbidities, translated into ICD-10 codes, are used by CMS to calculate a risk factor for each patient using hierarchical condition categories (HCC). The risk factor for each patient affects reimbursements to accountable care organizations and CMS payments under the hospital value-based purchasing program.

Formalizing documentation processes within the CCL is the CCL manager's responsibility. Maintaining awareness of current coding conventions and staying abreast of changes within coding systems is critical since codes and coding systems change frequently. Professional clinical documentation improvement personnel have primary responsibility to ensure that all procedures and services are coded and submitted properly for reimbursement. Structured reporting systems that utilize artificial intelligence and natural language processing have proven to improve coding and mitigate risk, and in turn can improve revenue.

Efficiency

Efficiency is crucial for CCLs to optimize revenue by increasing the volume of services provided per day. Efficiency can be gained by ensuring on-time starts, minimizing turn-over, smoothing schedules, or using block scheduling to minimize CCL down-time during the day. Communication among CCL team members is critical including morning “huddles” using Lean techniques, regular CCL leadership team meetings, and group debriefing after adverse events. Procedural techniques that optimize efficiency should be encouraged. For example, transradial access, coupled with same day discharge after PCI procedures, reduced CCL costs (by $3,689/patient) in one study.**3** The SCAI consensus document on CCL best practices lists additional strategies to optimize CCL efficiency.**4**

Expanding services

Expanding services is crucial. As interventional coronary procedure volumes have declined, structural procedures have stabilized CCL volumes and revenues. When clinically appropriate, increase a CCL's scope of practice to include peripheral procedures, implantable rhythm recorders, pulmonary artery pressure monitoring devices, and other new procedures.

3.2 Minimizing CCL expenses

Labor

Labor is a major CCL expense, which can be minimized by ensuring that all CCL personnel are “working at the top of the license.” Down time can be minimized by preventing late starts, decreasing

turnover times, and closing the CCL early on slow days. Overtime can be minimized by restricting after-hours procedures to those which clearly benefit patients and decrease length of stay.

Costs of disposable items

Costs of disposable items used in a CCL are unknown to most interventionalists. Making physicians aware that alternative products offer equal quality at less cost is often effective in changing their behavior. CCL managers should provide physicians with regular reports on their utilization of CCL time and equipment costs and how they compare to their peers in the same CCL. Interventionalists' natural competitiveness may cause outliers to modify their practices.

Costs of disposable supplies can be minimized through membership in buying groups, which leverage large numbers of buyers to obtain the lowest discounts from manufacturers. Other strategies include using competitive bidding processes, committing large volumes to a limited number of vendors in return for better pricing, bundling purchases of electrophysiology and structural devices, keeping contract pricing confidential so that vendors do not know what their competition is offering, using consultants to learn what deals have been struck by other institutions, and making sure that disposables are obtained on consignment rather than purchased outright.

Individual operators should not be able to make unilateral decisions to stock particular devices in the CCL. Instead, clinical use committees should evaluate all CCL equipment and supplies, especially new devices, to determine which should be available in the CCL. The Committee should include CCL physicians, CCL administrators, and supply chain personnel.

Teams negotiating with vendors should have a similar composition. These physician leaders can muster solidarity of CCL physicians to avoid undercutting negotiations, and advocate for patients and CCL physicians to make sure that equipment is available to provide optimal patient care.

Capital equipment costs

Capital equipment costs can be minimized by good maintenance to prolong equipment life. Some CCLs contract with vendors to obtain capital equipment “free,” in exchange for volume commitments of disposables. New technology should prove its worth before being purchased. Since capital equipment is a fixed expense, CCLs can decrease cost per case by maximizing the number of procedures done per piece of equipment per day by minimizing CCL down time, and operating the CCL during evenings and weekends.**1**

3.3 Minimizing non-CCL expenses

Under current CMS payment policies, CCL complications have a direct negative effect on hospital payments. While major complications are often reimbursed through a DRG “with MCC,” complications that do not qualify as “major” are uncompensated under the DRG system. CCL complications can increase the cost of care from $5,000 for a vascular access complication to $29,000 for emergency bypass surgery.**5** By increasing hospital costs and prolonging length of stay, complications decrease the hospital's profit margin.

CCL complications that lead to readmissions decrease hospital operating margins through the CMS Hospital Readmission Reduction Program, which reduces CMS payments by up to 3% to hospitals with excess readmissions of myocardial infarction and heart failure patients. The 30-day readmission rate

is significantly higher in patients who experienced a complication during angiography or reperfusion/revascularization during the index MI as compared to those without complication.**6**

3.4 Maximizing quality

Maintaining positive operating margins has become more difficult for hospitals due to declining reimbursement, increasing capitation, worsening payer mix (commercial patients aging into Medicare), increasing patient defaults on large deductibles, and the requirement to serve the needs of increasing numbers of uninsured or underinsured (Medicaid) patients. The transition from fee-for-service to value-based payments systems provides a strong incentive for CCLs to optimize quality and safety metrics to improve outcomes, minimize their costs, and avoid readmission penalties.

Optimizing quality and safety in the CCL requires that three measures of quality be addressed: structure, process, and outcomes.**7** These measures, to be most effective, must be applied not only at the level of the CCL but also at the level of individual physicians (Table 10).**3**

Table 10. Domains of quality in the cardiovascular catheterization laboratory (CCL)

- Structural (regulatory and compliance requirements).
  - Peer review.
    - Hospital quality assurance committee.
    - CCL quality assurance committee.
  - Credentialing criteria.
    - Initial and periodic (2 year) re-credentialing.
    - Credentialing committee.
  - Continuing medical education requirements.
  - Reporting (monthly, quarterly, and/or annually).
- Process (managing the patient).
  - Quality and safety processes of care.
    - Direct patient care.
    - Operational and administrative activity.
    - Guideline adherence (evidence-based practice).
    - Cost effectiveness, waste reduction, and appropriate utilization.
  - Direct patient care activities.

CCL physician and administrative leaders must ensure that strategies to control costs, which have been described above, do NOT compromise quality or safety.

Quality affects CCL operating margins

Under FFS and bundled payment systems, CCL revenues are increased by higher volumes of procedures resulting from third-party contracts and selection as a preferred provider by private payers. These are easier to obtain for institutions with demonstrably higher quality metrics. Contracts that offer higher payment rates may go to hospitals with excellent patient satisfaction scores and outcomes. Conversely, poor quality that leads to inefficiency and complications will increase costs and could lead to de-selection by payers.

Benchmarking

Benchmarking of key performance indicators, process metrics, and best practices against national standards allows CCLs to identify areas that they can target for improvement.

Appropriate use criteria

Appropriate use criteria (AUC) have been developed by professional societies in response to public debate regarding the utilization of procedures and mechanisms of payers to reduce reimbursement for procedures. The AUC were never intended to determine payment in individual cases, but some payers have wrongly used AUC to guide reimbursement policies. The societies that generate AUCs have stated that services performed for “appropriate” or “may be appropriate” indications should be reimbursed. Services that qualify as “rarely appropriate” should not be routinely denied, although they do require documentation to support payment. It is good practice to specifically document intentional variation and to address the individual patient's expected risk to benefit ratio. The use of AUC as a continuous assessment of practice patterns should guide more effective, efficient utilization of CCL resources, and ultimately result in better patient outcome**.**

4 ECONOMICS OF OUTPATIENT FACILITIES

CMS defines several types of CCL based on their “place of service” (POS). While most CCLs are hospital-based (POS 19 or 22), some are freestanding. POS 11 describes a laboratory, not at a hospital, solely physician owned and operated. Services are reimbursed through Medicare Part B Physician Fee Schedule non-facility RVU rates which includes payment for the physician work and both direct (supplies, equipment use, nonphysician clinical staff time) and indirect (overhead and office administration) practice costs.

POS 24 describes an ambulatory surgical center (ASC) where surgical and diagnostic services are provided on an ambulatory basis. ASCs may be owned by nonphysicians/investors, a hospital, or may be a joint venture between a hospital and a physician group. Services at an ASC are reimbursed through the Medicare ASC Payment System, which is based on the Medicare OPPS.

Hospital-outpatient centers and ASCs are accredited and regulated on state and federal levels; in select states office-based laboratories are exempt from some regulatory requirements. Office based labs (POS 11) are accredited to perform diagnostic coronary angiograms without intervention and diagnostic and interventional peripheral procedures on Medicare patients. Diagnostic and lower-risk endovascular procedures such as angiograms, coronary/peripheral vascular interventions, and electrophysiologic device implants can be safely preformed in freestanding and office-based laboratories.**8** Some commercial payers allow coronary interventional procedures, pacemakers, and internal cardioverter defibrillator placement in these settings as well. Complication rates are similar between hospital-outpatient centers and ASCs. Procedures appear to cost payers more at hospital-outpatient centers than ASCs**9** or office-based laboratories.**10**

In contrast to hospital-based CCLs (POS 19 or 22), office-based laboratories (POS 11) and ASCs (POS 24) more often operate as profit centers where operating margins determine their viability. They have been more aggressive in redesigning care to maximize outcomes and revenue through high quality documentation/coding, benchmarking, consolidation of care with interdisciplinary specialists, and competitive contract negotiations with vendors outside group purchasing organizations. Most pursue Joint Commission accreditation.

The changing focus of reimbursement models from FFS to patient centered quality measures and value will bring both opportunities and challenges for outpatient facilities, particularly with respect to competition between outpatient sites of service. In the future, outpatient facilities will likely offer lower cost, high quality, and higher patient satisfaction compared to inpatient facilities for elective cardiovascular services. As procedures become less invasive and conversion to open surgery becomes rare, even for more complex procedures such as endovascular aortic repair, outpatient facilities are likely to play a more prominent role in delivering CCL-based services and procedures.

5 SUMMARY

Understanding the economics of CCLs is essential for physicians, administrators, and other CCL personnel as they strive to balance the best possible patient care with fiscal constraints and competing demands for resources. An efficient CCL can provide superb cutting-edge patient care, excellent patient experience, extreme employee workplace satisfaction, and financial support for other less-profitable hospital programs. This article has reviewed general financial principles of CCL operation, and has emphasized that fiscal concerns should not limit the quality or scope of CCL services.

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Supporting Information

Filename	Description
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