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Alton Memorial Hospital: A Design for Success

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In 1988, Alton Memorial Hospital, a 222-bed non-profit community hospital, opened a diagnostic cardiac catheterization lab to supplement non-invasive testing, which included holter monitoring, echocardiography, and nuclear and pharmacologic stress testing. In December 2000, Alton Memorial Hospital began a primary angioplasty program that subsequently evolved into an elective program in 2002. Since that time, the Alton cardiac program has expanded to include a variety of other cardiovascular services, including enhanced external counterpulsation (EECP), cardioversions, pacemaker and ICD implants, peripheral vascular interventions, and a cardiopulmonary rehabilitation program.

Alton Memorial Hospital operates two cardiac catheterization laboratories in its Heart & Vascular Center. Room 1 is equipped with a six-year old Siemens Coroscope, and Room 2, the newest lab that went online in June 2006, uses Siemens Axiom Artis imaging equipment with a 30 x 40 cm flat panel detector (Figure 1). Both labs have Acist contrast injection systems and hemodynamic monitoring and procedure documentation is performed with the GE MacLab. All imaging is stored digitally on DICOM/PACS, which has been in use for the past two years. Each room contains a Pyxis electronic medication storage system.

Continued growth of the cardiac program has resulted in a total of over 1,130 patient interactions (see Table 1) through the cardiac catheterization laboratory. Today, four interventional cardiologists from St. Louis Cardiology Consultants perform procedures in the two Alton Memorial Hospital cardiac cath labs. Each interventionalist averages 400 cases annually (diagnostic, cardiac/peripheral intervention, and pacemaker/ICD implants).

The Alton Memorial Hospital cath lab staff consists of two medical imaging technologists (**RTRs**), two cath lab technicians, five RNs and one clerical person. The cath lab staff are each competent to serve in the scrub, circulator, and monitor positions and rotate through the roles to maintain competency. Competencies are verified annually through formalized internal processes. The department is in the process of establishing 24-hour call response teams with a goal of implementation in the fall of 2006. Lab staff have been cross-trained to ensure adequate staffing levels when needed. All staff are ACLS- and BLS-certified, and all nurses in the lab have critical care backgrounds.

With the anticipated growth and demand for all types of healthcare services, Alton Memorial Hospital is currently undergoing a \$40 million expansion project to be completed in 2009.

Angioplasty with off-site surgical support

Alton Memorial Hospital currently provides percutaneous coronary intervention (PCI) without open heart surgery (OHS) available on-site, sometimes considered a controversial practice. The American College of Cardiology (ACC) and the American Heart Association (AHA) have published guidelines concerning the performance of PCI without the support of on-site heart surgery. The ACC/AHA guidelines classify primary and/or elective angioplasty as "IIb." The "class II" designation refers to "a condition for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment." The "b" descriptor suggests "Usefulness/efficacy is less well-established by evidence/opinion."

Based on these guidelines, the ACC/AHA guidelines do not recommend PCI in institutions without OHS services on-site. However, a growing body of evidence supports PCI as a superior treatment versus thrombolytics in patients presenting to the ER with ST-elevated myocardial infarction (STEMI). As published clinical outcomes of coronary angioplasty in facilities that do not have cardiac surgical programs on-site continue to demonstrate the safety and efficacy of angioplasty, more institutions without open heart surgery programs are expanding their cardiac offerings to provide primary PCI at a minimum. The goal is to provide better cardiac care to their communities.

Furthermore, recent advances in PCI technology, combined with skilled physician operators who perform a minimum of 75 coronary interventions per year, of which at least 36 should be primary interventions, continue to demonstrate that PCI can be performed with or without the presence of OHS. Current research shows that the incidence of emergency bypass surgery due to cath lab accidents, vascular occlusions or pseudoaneurysm requiring surgical intervention in patients at facilities without on-site cardiac surgical services is less than 1 percent.¹

Ultimately, the decision to perform PCI with or without OHS is contingent upon each state's Department of Health regulations, as well as physician support. Presently, 25 states, including Illinois and Missouri, permit PCI in institutions without OHS services. Out of the remaining 25 regulated states, all but five are in the process of performing clinical studies or petitioning to do so, while some have grandfathered institutions able to perform primary and/or elective PCI without OHS, despite current regulatory restrictions.

Alton Memorial, together with the support of their tertiary partner Barnes-Jewish Hospital, initiated a primary and elective PCI program with open heart surgical back-up provided by Christian Hospital Northeast in St. Louis, MO, located 12 miles away. **In early 2000**, Alton Memorial Hospital established a transfer agreement with Christian Hospital Northeast primarily because they are geographically located within an 8-10 minute ambulance trip from Alton Memorial, they have a reputation for providing excellent heart surgery services, and they are partners within BJC HealthCare. In fact, Alton Memorial has enjoyed a successful working relationship with Christian Hospital Northeast since the diagnostic cath program was implemented in 1988.

¹ "Primary Angioplasty for the Treatment of Acute Myocardial Infarction: Experience at Two Community Hospitals Without Cardiac Surgery". Wharton, T., P., et al
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In the event that OHS is necessary, Alton Memorial transfers the patient to Christian Hospital Northeast for emergency surgery. Alton Memorial Hospital, Christian Hospital Northeast, and Barnes-Jewish Hospital each submit outcomes data to the ACC-NCDR (National Cardiovascular Data Registry) and adhere to the American College of Cardiology quality guidelines. Alton Memorial began submitting interventional-only data to the ACC in 2004 and presently submits all data, both diagnostic and interventional.

"The development of the PCI program here has provided a wonderful opportunity for patients in our community to have high-quality coronary interventional services available close to home in the event they should require care urgently or on an outpatient basis," said Dr. Saad Bitar, a board-certified interventional cardiologist practicing at Alton Memorial Hospital. "The staff is top-notch, well-trained, and able to go into interventional mode as quickly as I have seen in any organization."

Clinical experiences and growth

Dr. Robert Lutan, also an interventional cardiologist, performed the first angioplasty procedure at Alton Memorial Hospital in 2000. "In the years since, we have grown by leaps and bounds. The hospital has committed its resources to provide the highest-quality heart services possible to the community as evidenced by the recent addition of a second cath lab and complete renovation of its cardiology services department. I have worked closely with and assisted in the training of the excellent cath lab staff here and look forward to more great things in the future."

Since 2000, the Alton Memorial Hospital invasive/interventional cardiology program has grown considerably. An analysis of this growth, using 2001 as the base year, shows that the hospital experienced a 31.4 percent (16 cases) growth in PCI procedures in 2002; 55.7 percent (64 cases) in 2003, 47.8 percent (105 cases) in 2004; and 12.4 percent (31 cases) in 2005.

Table 1
Cardiac Catheterization Laboratory Statistics

Year	Diagnostic Volume	PCI Volume	Peripheral Volume	Device Volume	Patient Encounters
2000	498	6			504
2001	392	35			427
2002	520	51		15	586
2003	481	115	72	76	744
2004	536	220	152	70	978
2005	608	251	136	137	1,132

Table 1 outlines the impact of PCI services on Alton Memorial Hospital's diagnostic catheterization volume. Prior to 2000, the diagnostic cath volume had decreased 15.4 percent over the previous 10 years, but with the implementation of advanced cardiac services (PCI), Alton Memorial Hospital has experienced 22.1 percent growth in diagnostic heart catheterizations during the last five years, which equates to an increase of 184 patients during this period.

Through the addition of advanced cardiac services, Alton Memorial Hospital has also experienced growth in pacemaker and internal cardiac defibrillator (ICD) implants. Beginning in 2002, pacemaker and ICD insertion moved into the cardiac cath lab. The total case volume for that year was 15 implanted devices. By 2005, this volume grew to a total of 137 implanted devices, an 89.1-percent increase in just three years.

In 2003, Alton Memorial Hospital initiated a peripheral vascular program, with procedures performed in the cardiac cath lab. The hospital performed 72 cases during the first year of this program. Today, the peripheral program has grown 47.1 percent, with a 2005 total procedure volume of 136 cases. As seen in Table 1, patient visits/procedures in the cardiac cath lab have experienced double-digit increases over the last four years. With significant increases in patients and procedural volume, Alton Memorial Hospital elected to install an additional cardiac cath lab to allow for continued growth and expansion in their market. In late June 2006, Alton Memorial received a final inspection from the Illinois Department of Public Health and subsequent approval to begin performing procedures in the new lab. The room (23 ft x 26 ft) is equipped with the Siemens Axiom Artis imaging equipment. Staff provided input in the design of cabinetry and storage as well as the types of equipment used in the new lab.

The additional procedural space enables Alton Memorial Hospital to provide more timely advanced services to a growing number of patients with cardiac and vascular disease, the majority of whom desire treatment closer to home at a facility with demonstrated excellence in clinical outcomes.

Quality outcomes

The ACC-NCDR database benchmarks diagnostic catheterizations and PCI quality indicators, as well as utilization. Quarterly data submitted from Alton Memorial Hospital is benchmarked against hospitals with similar demographics in order to provide a more accurate comparison of outcomes. The data provided in this report is derived from the 10 variables as detailed in the 2005 annual summary from the ACC-NCDR (ACC-NCDR® CathPCI Registry™). Alton Memorial was in the 99-100 rank percentiles for four of the 10 variables. For PCI, this included door-to-balloon time, PCI procedure success, incidence of non-obstructive CAD, and incidence of vascular complications in diagnostic procedures. Alton Memorial was "above-average" in PCI angiographic success, and within the "average" range for incidence of vascular complications in PCI (2.9 percent), use of thienopyridine on discharge (96.3 percent), angiographic success in stented lesions (99.5 percent), PCI length of stay (2.4 days), and average number of stents per PCI procedure (1.6).

Tables 2 and 3 reflect the complication rates Alton Memorial Hospital has encountered, as well as types of complications encountered since the initiation of the PCI program.

Table 2
Complication Rates

Year	Non-Death	Death	PCI Procedures	Overall Complication Rate	Death Rate
2002	2	0	51	3.92%	0.00%
2003	2	1	115	2.60%	0.87%
2004	1	1	217	0.92%	0.46%
2005	2	1	251	1.19%	0.39%

**Table 3
Complication Types**

Complication	Occurrence
Vascular complications (all types)	3
Retroperitoneal complications	2
Catheter-induced left main dissection	1
Spiral dissection RCA- due to previous stent placement	1
Death	3

According to the ACC-NCDR 2005 fourth quarter report, Alton Memorial Hospital has an average door-to-balloon time of 82 minutes for patients experiencing an acute myocardial infarction (AMI). Through internal performance initiatives, outlier case reviews and improved interdepartmental collaboration, Alton has been able to significantly decrease their average door-to-balloon time to 58 minutes according to Alton's internal reporting process for the month ending August 2006. This is clearly within the 90-minute benchmark for quality reporting. To achieve this result, Alton Memorial employs a dedicated team committed to quality and patient outcomes using clear policies and procedures. As demonstrated above, door-to-balloon times have steadily decreased since they began monitoring this parameter as part of a performance improvement initiative in late 2005.

When a patient enters the ED with a suspected AMI, a timer is placed on the patient to remind everyone in contact with the patient that time is of the essence. Once confirmation of AMI is established, the patient is immediately brought to the cath lab for emergent treatment. This is an effective system because everyone involved — the paramedics, ED nurses, lab personnel, ED physicians, cardiologists, and cath lab staff — understands his or her role and how crucial time is when treating a patient with confirmed AMI.

To provide coronary angioplasty services without on-site open heart surgery, Alton Memorial Hospital is required to have a well-designed and frequently-practiced action plan for PCI patients who require emergency transfer to the surgical hospital partner. This plan has been developed with the goal of facilitating emergency patient transfer within one hour to ensure that the surgical intervention is performed without unnecessary delay and before additional complications arise.

Understanding the significance of complications associated with performing PCI in a facility that does not provide open heart surgery on-site, Alton Memorial's policy dictates that an ambulance wait on standby, ready for an emergent transfer prior to the start of a PCI procedure. Furthermore, the operating room at the surgical back-up partner is always made aware that a PCI is being initiated at Alton Memorial Hospital and that the potential for an emergent transfer exists. The staff is balloon pump-certified and a cath lab nurse always accompanies the patient during transfer.

The standard for initiating the potential transfer for emergent surgery is that a cath lab staff member, typically the monitor/recorder will initiate a call to the EMS department to ensure an ambulance is on site and prepared for a possible transfer prior to the case beginning. A call is then placed to the operating room desk at CHNE to inform them that a PCI will be in progress shortly and the potential exists for an emergent transfer. Post-procedure, EMS is released (if not needed) and a call is placed to the operating room desk to inform them that the angioplasty is completed and that the patient will not require transfer at this time.

Alton Memorial Hospital's total to-date complication rate for PCI is 1.83 percent and the death rate is 0.52 percent, as reported by the ACC-NCDR. By comparison, as reported by Singh et al from the Mayo Clinic² as well as **several** other national articles, the average in-hospital and **30 day** mortality rates for PCI ranged from 2.8 percent to 9.8 percent. At 1.83 percent, Alton Memorial's total PCI complication rate is below the national average mortality rate described in the Mayo Clinic article and elsewhere. The experience at Alton Memorial has clearly demonstrated that PCI can be, and is, safely performed with minimal complications and excellent clinical outcomes in the community setting using an off-site partner for OHS when necessary.

Community impact

Prior to implementing angioplasty at Alton Memorial Hospital, patients typically had to travel a minimum of 12 miles to Christian Hospital for advanced care for AMI. With interventional cardiac services now on-site, Alton Memorial Hospital has significantly impacted patients in the community by basically eliminating the need to travel out of state for angioplasty. This has led to higher levels of patient satisfaction, as well as lowered stress levels for patients and families, who previously may have experienced travel and insurance issues from seeking care across state lines. Alton Memorial's angioplasty program has allowed patients within its designated service area of Calhoun, Greene, Jersey, Macoupin, and Madison counties to obtain care closer to home with less travel hardship.

The availability of advanced cardiac services at Alton Memorial addresses one of the key issues associated with elevated cardiovascular disease mortality rates — limited access to immediate care for AMI. The success of the Alton Memorial Hospital angioplasty program may be playing a role in decreasing the cardiovascular disease mortality rate in the service area, as demonstrated in Table 4 below.

**Table 4
Cardiovascular Disease Mortality Rate
Age Adjusted Per 1,000**

	Mortality Rate per 100,000 Population				
	1999	2000	2001	2002	% Change 1999 to 2002
Calhoun County, IL	447.6	415.8	368.2	285.4	?36.3%
Greene County, IL	295.7	412.8	245.2	283.2	?3.3%
Jersey, County, IL	384.6	321.3	349.1	376.3	?2.2%
Macoupin County, IL	338.2	295.6	245.1	281.7	?16.8%
Madison County, IL	335.0	326.6	300.1	298.1	?11.1%
Illinois State Average	300.1	284.6	271.6	266.4	?11.3%
National Average	287.8	279.2	269.0	261.5	?9.2%

** Source: Centers for Disease Control and Prevention (1999-2002 data)*

² JACC Vol 39, No 12, 2002

Patient satisfaction

Alton Memorial Hospital understands the importance of patient satisfaction, and has taken a proactive approach to monitor satisfaction outcomes along with quality reporting mechanisms. The primary method used to determine patient satisfaction is a telephone call within 24 hours of discharge, during which the patient is asked to rate their overall experience. Patients are also asked about any follow-up questions that may have come up since discharge, and should report an assessment of the puncture site.

All information is recorded and tracked to determine an overall satisfaction score based on the patient experience at Alton Memorial Hospital. Any issues, such as status of a groin puncture site, questions regarding post-care, overall experience, staff recognition, and opportunities for improvement are identified and immediately reviewed and, when necessary, policies and/or procedures are modified to eliminate similar issues for future patients. As a result of this "personal touch," from 2005 to the present, Alton has experienced an increase in whole-house patient satisfaction, moving from the 50th to the 70th percentile overall patient satisfaction rankings, which further reinforces the facility's commitment to high-quality care delivery.

Conclusion

Throughout the United States, the implementation of angioplasty without open heart surgery on-site is being closely watched by the American College of Cardiology, as well as other professional and academic societies. Alton Memorial Hospital's experience with PCI clearly demonstrates that establishing a quality framework — both clinically and operationally — with strong physician and administrative support are critical for success.

Reporting outcomes to the ACC-NCDR or other similar database is essential. ACC-NCDR reporting allows the organization the opportunity to benchmark their outcomes against similar organizations. This process also provides necessary information to the ACC regarding clinical outcomes in a facility that performs PCI without cardiac surgery on-site which can be used to recommend changes to the ACC/AHA guidelines.

As Alton Memorial's cardiac program has grown to include more advanced coronary interventional services, the impact was felt throughout the organization, and the quality of care has been raised across related specialties.

Diagnostic cardiac cath volume has grown, as have PCI procedure totals, allowing further development and subsequent growth in device implants. Growth of these additional services can be tied directly to Alton Memorial Hospital's offering of advanced PCI services in a timely manner closer to home, a standard of care that patients across the country now want and expect. The challenge, however, is to meet or exceed patients' expectations and maintain the financial viability of the program while fulfilling the clinical and operational quality requirements necessary for continued program growth.

With successful program outcomes over five years, Alton Memorial Hospital has demonstrated that a community hospital without OHS on-site can successfully perform PCI with clinical outcomes comparable to those at tertiary centers. Given the controversial nature of this practice, and considering that many states have differing regulations, the Alton Memorial experience of implementing PCI with off-site OHS can perhaps shed some light on the benefits of angioplasty in the community and likewise reveal the viability of this service for patients living in rural or suburban locations.

Despite conflicting opinions, future outcomes from clinical trials and state demonstration projects will no doubt reinforce the value of offering PCI in the community setting, hopefully leading to wider acceptance of this practice. The Alton Memorial Hospital experience and the cumulative impact of other similar success stories can be a start.

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