

# Anesthesia on a Shoestring: Pulling it up by its Bootstraps

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## I. Introduction:

Many of the members of the SPA have provided anesthesia and critical care services during brief (1-4 weeks) volunteer surgery abroad (VSA). For those with a special interest in any aspect of international anesthesia, SPA has established the SPA Committee for International Education and Service (SPACIES), and all are welcome to participate.

We live in a time of remarkable advancements in the fields of pediatric anesthesiology and critical care. Technological advances have allowed us to provide extracorporeal pulmonary and cardiac support, establish improved techniques for blood salvage for complex craniofacial and spinal surgeries, and administer pain relief with epidural catheters controlled by patients themselves. For most of the world's population, the critical medical questions are much more basic. Infectious diseases remain the primary nemesis. For example, worldwide, over 2.9 million deaths per year occur due to tuberculosis and malaria<sup>1</sup>, while measles, tetanus, and diphtheria claim a combined total of 1.6 million lives each year<sup>2</sup>. As one might expect, the vast majority of these deaths occur in underdeveloped countries.

Congenital and acquired deformities such as cleft lip and palate, and burns, occur commonly in underdeveloped countries. In underdeveloped countries, these defects are often left without repair because the cost of the operation may exceed the average yearly income for an entire family. While these deformities may not carry the same public health importance as infectious illnesses, they do have crucial psychosocial and medical implications. VSA organizations provide these surgeries free of cost to many thousands of patients around the globe yearly.

## II. Reasons for participation in VSA:

Why should we get involved in VSA? As pediatric anesthesiologists, we have a crucial skill required for the care of children during VSA projects. But, why get involved when the demands of our practices at home keep growing, and when academic programs give limited support and recognition to such efforts? Shaywitz lists several pragmatic reasons for physician involvement in global health issues<sup>3</sup>, but argues that the most important reason is that "concern for the health of others defines, above everything else, what it means to be a physician, and represents why so many of us were attracted to this unique calling." Involvement in VSA provides enormous personal rewards, derived from the opportunity to provide a child with an otherwise unobtainable surgery, and the chance to reacquaint oneself with idealistic reasons for entering medicine. Other tangible benefits include creation of new contacts and friends, and the opportunity to face new challenges in distant parts of the globe. Additionally, media attention during VSSA often attracts heads of state or their immediate representatives. That attention may allow us to participate in enhancing U.S. stature abroad, which could be important during our war on terrorism.

### III. Differences between organizations, and how to choose one that is right for you:

VSA organizations differ in many ways, including size, background, and countries they serve. How might one choose an organization? The SPA web site contains a searchable index of U.S. based volunteer organizations, which includes at least 30 VSA agencies ([http://www.pedsanesthesia.org/vmsa\\_search.iphtml](http://www.pedsanesthesia.org/vmsa_search.iphtml)). Those agencies differ in the types of surgeries they perform, but one commonality, with few exceptions (i.e. pediatric cardiac surgery), is the need to perform operations that do not require much follow-up. Differences exist in the size and composition of the mission team. Some organizations use the multidisciplinary team approach that has become common in developed countries; taking a speech therapist, child life specialist, biomedical technician, and dentist, in addition to surgeons, anesthesiologists, a pediatrician, an intensivist, and the full assortment of specialized nursing personnel. Other organizations take a bare-bones crew, relying on local nursing, and accepting that the care they will administer will be further from standards typical in developed nations.

VSA agencies differ from one another in their ability to effectively organize, in their degree of screening of volunteer's credentials, and in their pre-mission preparation (such as a site visit). They also differ in the physical demands of their work schedules, the degree of intra-operative patient monitoring they use, their re-use of "disposable" equipment, the amount of equipment and medications they expect anesthesia providers to "borrow" and transport from their own institutions, and in their focus on the development of host country education and self-sufficiency. One should consider all these differences, when choosing the organization that best fits one's personal objectives, abilities, and comfort level.

### IV. Potential Pitfalls:

Enormous amounts of resources are invested whenever a VSA team and equipment are transported to a project site. Numerous problems can derail a mission, and awareness of those problems may help to avoid wasted resources and disastrous outcomes.

#### A. Planning Pitfalls:

Lack of planning by the VSA agency can preclude success in several ways. Failure can result if a facility is chosen that is not adequate for the surgical goals, or if in-country expectations of the project are poorly understood. A preliminary site visit, several months prior to the VSA project, is important because the adequacy of the site, and in-country goals can be determined. Relationships with local supporters of the project, with medical staff leaders, and with hospital administrators can be cultivated and nurtured. The number of available operating rooms, and the availability of adequate PACU and postoperative areas, can be determined and often requires some negotiation. One can also determine the availability of adequate ancillary resources, as determined by the type of surgery planned. Those resources include blood banking, radiography, and laboratory services. When around the clock laboratory services are not available, devices for

point of care testing, such as the I-STAT, are easily transported and allow for self-sufficiency and rapid turnover times. Other VSA agency planning glitches include poor in-country advertisement of the VSA project, and failure to timely ship crucial medical supplies to the project site.

Perhaps the most important planning function of the VSA agency is the determination of team composition. Adequate numbers of qualified staff should be available to take care of post-operative and intra-operative problems that occur simultaneously. To achieve that goal, a qualified physician should have the exclusive duty of caring for recovery room patients and patients that require critical care. Failure to have such an individual results in an anesthesiologist from the OR filling that role, which may increase response time, and actually shut down an OR when ongoing critical care is needed. Relying on post-operative care provided entirely by nursing staff of the host hospital may be a form of Russian roulette, as the quality of that care varies substantially. Agencies must insure that health care providers have adequate credentials to care for the patient population being served. Unfortunately, there are no clear guidelines on what constitutes adequate credentials. However, it is safe to say that anesthesia providers who become involved in a VSA project because they “want to brush up their pediatric skills”, and surgeons seen reading the book while on the plane to the VSA project site are not optimal candidates. Host country anesthesia practitioners who want to participate should not be left alone to run their own table until they have proved that they are capable.

#### B. Personal health problems:

Health care providers that fall ill during the project can jeopardize achievement of project goals, not to mention the detrimental effects on individuals themselves. Preoccupation with the rigorous demands of preparing for the VSA project must not cause practitioners to neglect issues related to their own health. Close attention should be paid to anti-malarial and vaccination requirements, and to health advisories as listed at the CDC website (<http://www.cdc.gov/travel/>).

#### C. Infrastructure deficiencies:

Infrastructure deficiencies are common, may jeopardize patient safety, and may temporarily shut down surgery. Supplies of electricity, O<sub>2</sub>, and water that are adequate for in-country hospital operation may be inadequate for the intense VSA project demands. One should be especially suspicious of wall O<sub>2</sub>, which does not allow visualization of the source or the residual amount of O<sub>2</sub>. Back-up equipment, such as flashlights, manual BP cuffs, extra O<sub>2</sub> tanks with regulators, and self-reinflating bags should always be available at each OR bedside and in the recovery area.

#### D. Misjudgments in patient selection:

Careful patient selection is critical to the success of the VSA project. Inappropriate selections may result in bad outcomes that may temporarily shut down a project, overshadow the project’s successes, and impact on the host/VSA agency relationship. Bad outcomes during VSA projects can even impact on how

VSA projects are viewed by the public at large. Experienced clinicians must be present during the screening process so that previously undiagnosed medical conditions can be identified. Patient selection can be difficult because VSA patients differ from those which anesthesia practitioners are accustomed to. Many VSA patients are malnourished, have chronic respiratory symptoms, have advanced states of the surgical condition, and may be considerably older than patients with similar problems cared for in developed nations. Surgeries that may be perceived as elective in developed countries may not be entirely elective in the VSA setting. Families who have limited or no other opportunity to have their child's deformity operated, and who have used significant resources and traveled great distances to reach the VSA project site, are willing to take greater risk than one would normally associate with "elective surgery." While recognizing that optimal medical condition may not be attainable in some patients, one must understand that selection of patients who are likely to develop complications jeopardizes the success of the project. Some VSA agencies have established general guidelines for exclusion of patients based on type of surgery and the patient's age and weight. The selection of a known difficult patient should only occur when team leaders from anesthesia, surgery, nursing, and pediatrics have carefully considered that patient, and all agree that skill levels and resources are available in all disciplines to provide safe care.

No data exist regarding the value of pre-operative screening laboratories during VSA projects. Screening the PT and PTT will miss many (if not most) coagulopathies, and is therefore of unknown value. When taking a history, questions should be asked that identify bleeding diatheses. Unfortunately, some families deliberately conceal crucial history for fear that their child will not be operated. One child, whose parents concealed his hemophilia, had a normal PT and PTT, turned out to have von Willebrand's disease, and bled approximately one blood volume during a combined lip and palate repair. Preoperative hematocrit, and type and screen are important if blood loss is expected (i.e. cleft palate, some burns), especially given the high incidence of anemia, and the greater difficulties procuring and safely administering blood in the VSA setting. When blood transfusion is necessary, and time permits, testing the hematocrit of the unit of blood prior to transfusion is prudent.

#### E. Equipment Problems:

Even with appropriate patient selection and with qualified anesthesia practitioners, problems may ensue related to equipment deficiencies or malfunctions. Smaller and more advanced transport monitors have allowed portability of modern patient monitoring to remote VSA project sites. Some agencies have gone so far as to adopt end-tidal CO<sub>2</sub> monitoring for all patients. One should insure that the level of monitoring is at least as high as the host country's standard. A typical anesthesia set-up involves a Mapelson D or F circuit connected to a variable-bypass, flow-over vaporizer that is secured to a tabletop. Vaporizer tipping during an anesthetic can quickly administer a lethal dose of potent agent. Alarms that respond to equipment issues, such as high concentration

of agent, circuit disconnect, and high circuit pressure are usually nonexistent, and vigilance is therefore crucial.

#### F. Critical events:

Despite excellent planning and attention to patient care detail, critical events will happen, and seem to happen more frequently in the VSA setting than in developed countries. A carefully designed resuscitation kit, including a defibrillator, should be located in a place with easy access to all perioperative areas. During VSA projects, deaths occur with a frequency of approximately 1 per 5000 patients. For agencies with projects of 100-150 patients, a death occurs only once per 30-50 projects. Therefore, it is likely that none of the staff will have previous experience dealing with death during a VSA project. Fisher offers an enlightened discussion of how to manage that situation<sup>4</sup>, with the goal being to “avert misunderstandings, program disruption, or erosion of team cohesion,” and to uncover system errors that may jeopardize subsequent patients. Suggested actions include temporarily stopping surgery, convening a morbidity and mortality conference with all individuals involved in the incident, meeting with family members, meeting with host country sponsors and local medical staff, and meeting with the entire VSA team to debrief and discuss both the incident and the timing for resumption of surgery. Liability for untoward outcomes that occur during VSA projects has not been an issue to date; to the knowledge of members of SPACIES, there has been no occurrence of a malpractice suite against a VSA provider. Nonetheless, practitioners may want to check with their malpractice providers regarding their coverage during VSA projects. Some malpractice providers will provide coverage during VSA projects, but require notice prior to each project. Obtaining patient consent is often overlooked during VSA projects, but can serve to ground unrealistic family expectations, prepare families in the event of an untoward outcome, and may offer some legal protection.

#### V. Improving VSA

Improving VSA requires making improvements in the quality of health care administered during VSA projects, and requires empowering countries to eventually do the work themselves.

One might presume that the quality of VSA care has improved because many agencies now have decades of experience to learn from, have transportable modern equipment, and have modern anesthetic agents. However, we currently have no mechanism to assess whether these things have positively impacted patient outcome. Research will need to be incorporated into the VSA framework, but has so far been rare due to cost, lack of expertise, clinical production pressure, and lack of coordination between VSA agencies. Quality assurance (QA) programs are essential, and QA committees need to establish databases that include untoward events. Prospective analysis of factors involved in adverse outcomes will be an important first step in improving quality of VSA care. Prospective comparisons of different VSA practices will also be important. Additionally, changes may need to be made in areas of VSA care that do not easily lend themselves to study, but intuitively represent improvements, such as decreasing reuse of disposable items.

VSA agencies can multiply the results of their efforts by empowering countries to reach self-sufficiency. In a few cases, such as the Operation Smile's (Norfolk, VA) model in Columbia, countries have become VSA regional resources for neighboring countries. An approach that incorporates education and host country empowerment, promotes a healthier relationship between the host county and the VSA agency. Such an approach requires development of an effective educational program, identification of qualified and dedicated host country practitioners, and development of host country financial resources. Unfortunately, some countries are poorly equipped to respond to this approach, and show little progress after years of efforts. Zbar et al of Interplast (Mountain View, CA) argues that VSA programs without this approach are a form of "medical colonialism."<sup>5</sup> They suggest that progression to self-sufficiency should be a prerequisite for continuation of a country's program, and that lack of progression should lead to "friendly termination". Others argue that many countries are unable to develop their own programs, and that "medical colonialism" is more compassionate than "friendly termination".<sup>6</sup> However, all agree that efforts to empower host-countries are an important part of advancing VSA.

VSA agencies must create dialogue with one another to discuss the many issues involved in this type of work. They must also coordinate scheduling of projects to avoid duplication of services. We need to examine the role of small agencies and solo projects that are too small to insure provision of adequate numbers of qualified staff, that do not have the financial resources to provide proper equipment and medications, that are unable to perform QA, and that cannot make organized efforts to empower host countries. Creation of a national organization for VSA might facilitate dialogue on these issues.

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