



# EDUCATION NEWS

**Cormac T. O'Sullivan, CRNA, MSN**  
**Edward S. Thompson, CRNA, PhD**  
Iowa City, Iowa

## ECONOMICS AND THE EDUCATION OF NURSE ANESTHETISTS: PART 1

*General economic principles and healthcare economic principles in particular are described, explained, and related to the current US system. Economic issues are explained in relationship to nurse anesthesia education as it exists in the current healthcare environment. Prior publications related to economics and nurse anesthesia are reviewed, critiqued, and related to the current healthcare system and the education of*

*nurse anesthetists. Economic assumptions and other factors affecting the economics of nurse anesthesia education will be discussed in Part 2 of this 2-part column, which is scheduled for publication in the December 2004 AANA Journal.*

**Key words:** Costs of nurse anesthesia education, economics, economic principles in anesthesia, rate of return for CRNA education.

### Economic foundations

Loosely defined, economics is the study of how people make choices under conditions of scarcity and the results of those choices.<sup>1</sup> Economic arguments are thought to revolve around the distribution of money, but also can encompass personnel, equipment, the environment, or anything that is available in a limited supply and requires a decision about distribution. There are pure private goods (healthcare, food, and groceries), which are subject to rivalry where nonpurchasers can be excluded from consumption, and there are pure public goods (national defense, uncongested parks, and public highways), which are not subject to rivalry and nonpurchasers cannot be excluded. Most goods are not purely public or purely private but fall somewhere in between.<sup>2</sup> The distribution of both public and private goods is ultimately determined by societal preferences.

If society regards healthcare as a "right," then it will be made available to all and paid for with public money (taxes). If society does not regard healthcare as a "right," but a privilege, it will be available for con-

sumption by those who are willing to pay for it and excluded from those who are unwilling to pay. In the US healthcare system, some aspects of care are considered a "right" while others appear to be regarded as a private responsibility. In either case, a basic tenet of welfare economics is that decisions about resource allocation and consumption of all goods should be made in order to maximize social welfare. In order to achieve maximization, resources must be distributed to those individuals that derive the most value from them, although not necessarily in a monetary sense. Maximization must then be accomplished within a given budget.

The distribution of healthcare resources is complicated because healthcare services usually must be supplied to a particular person at the point and time of care and cannot be stored for use at a later date like oil, steel, or widgets. It is even more difficult to assign monetary values (*values*, not costs, not charges) to healthcare services, resources, treatments, etc. Economists solved this problem of value assignment by valuing welfare as utility gained or lost, with 1 unit of

utility "a util" being equal to 1 unit of personal satisfaction. It is accepted that individuals derive satisfaction from various sources including money, career, companionship, health, physical activity, education, etc.<sup>1(pp106-108)</sup> To quantify how much utility is derived from a given activity, economists measure the opportunity cost of the activity or what a person is willing to give up to gain one more unit of that activity.<sup>1</sup> For example, if bedtime is 10 PM, the opportunity cost of watching television until midnight is the 2 hours of lost sleep. A related concept is the reservation price of an activity or the price of something at which a person is indifferent between having or not having an object.<sup>1</sup> Someone might be content paying \$2.50 for a really good slice of apple pie but decide that \$2.51 is too much. This person's reservation price for that piece of pie is therefore \$2.50. This is an example of the "not-one-cent more" attitude that is often a deal breaker.

Both of these concepts can be applied to the education of nurse anesthetists in general and specifically to retaining quality faculty. Since most jobs in anesthesia edu-

cation pay less than providing anesthesia in private practice, it is assumed that nurse anesthesia educators must derive increased utility from teaching and are willing to give up additional salary for the utility gained from the satisfaction of teaching. It could be said that a given educator's reservation price for teaching instead of entering private practice is the difference between the 2 salaries. The reservation price varies by individual, with some educators entering private practice for a relatively minor increase while others wait for a substantially higher salary. Similarly, the educator's opportunity cost of not pursuing a private practice career is the difference in salary and the lifestyle enhancements that job would offer. These concepts can be applied to other situations including anesthesia practice and healthcare delivery in general.

Everything has a utility. Everyone has a reservation price. Both are individualized and vary dependent upon circumstances, age, responsibilities, etc. The satisfaction received and the willingness to pay for rock concert tickets are very different at age 16 than at age 46. Activities such as work, vacation, and family increase utility; while other issues such as illness and stress decrease utility. Many measures of utility derived from health and healthcare services have been developed. Quality-adjusted life years, where perfect health is rated 1.0 and death is rated 0.0, is the most widely accepted of these measures.<sup>3</sup> Certain chronic illness states, such as being confined to bed with chronic pain, are rated as negative utilities by patients.<sup>4</sup>

As stated, economics is the study of choices made throughout life to maximize our personal utility. Unfortunately, it is not always possible to increase one person's utility without reducing someone

else's utility. Individuals usually only consider the impact on their own utility when making decisions about themselves or their families, not social utility or welfare. This is evident in the healthcare environment as clinicians must make care decisions about 1 patient at a time, without considering how those decisions will affect other present or future patients. This is, of course, central to the clinician's role in delivering high quality healthcare to a given patient. However, it is counterproductive to delivering high quality healthcare to millions of Americans annually in a cost-effective manner.

### Health economics

The study of health economics applies many of the principles of welfare economics to healthcare in an attempt to determine the best allocation of resources in an effort to provide the largest amount of the highest quality healthcare to the greatest number of patients.<sup>5</sup> Health economists use tools such as, but not limited to, cost-effectiveness analysis, labor and workforce models, supply and demand curve analysis, production function models, and production possibility curves to measure utility gained from various allocations of healthcare resources. The 4 basic questions that a health economist seeks to answer are:

1. What combination of nonmedical and medical goods and services should be produced for the economy?
2. What particular medical goods should be produced in the health economy?
3. What specific healthcare resources should be used to produce the final medical goods and services?
4. Who should receive the medical goods and services?<sup>5(p5)</sup>

The first question must be answered because resources devoted to healthcare services are then unavailable for producing non-

healthcare services. The United States currently spends \$1.3 trillion, or 14% of the gross domestic product (GDP) on health and is predicted to consume \$2.4 trillion, or 16% of the GDP by 2010.<sup>6</sup> Since 1960, healthcare expenditures have grown 2.5% faster than the overall GDP, and this trend is predicted to continue.<sup>7</sup> Unless Americans reduce their demand for healthcare, ultimately, greater expenditures on healthcare mean less money for other nonmedical goods and services. In addressing the second question, it appears that instead of deciding what goods and services to produce, healthcare practitioners, companies, and institutions simply produce as much as they can without worrying about what is economically appropriate or socially efficient. The answer to the third question is similar to that of the second because family members and caregivers demand resources needed for a given patient with minimal concern for what is socially efficient. The fourth question deals with societal values or "preferences" about alternative distributions of resources (ie, what is socially efficient?).

The preceding questions are presented to stimulate thought rather than expecting or presenting answers. Within this discussion, "healthcare resources" will be loosely defined as "something used in a healthcare production function to improve a patient's well-being." Resources will include surgery and surgeons; Certified Registered Nurse Anesthetists (CRNAs), anesthesiologists, and students in anesthesia educational programs; operating room, recovery, and floor nurses; and drugs, hospital beds, housekeepers, suture material, and electricity. Perhaps a better way to decide what resources are needed is by posing the question, "Exactly what is being produced?" Examples

in this article will limit resources to those needed to produce CRNAs.

## **Demand for healthcare and anesthesia**

The demand for healthcare cannot be directly measured because people do not gain utility from receiving health services.<sup>8</sup> Utility is gained by increasing the number of illness-free days a person lives both annually and in his or her lifetime. Therefore, all healthcare services including surgery, anesthesia, physical therapy, and medications, are investments in “personal health stock” so that one can hopefully live a long, happy life. If life is viewed as a continuum that begins at birth and ends with death, then health stock is constantly generated, used, and regenerated as we progress across the continuum. During youth, exercise, eating right, and other small investments pay huge dividends or gains in health stock. As we age, larger and larger investments in prevention and healthcare services result in considerably lower dividends until eventually we spend more on prevention and treatment than is received in benefits or added health. This is a direct result of the decreasing marginal rate of return on investment.<sup>8</sup>

Nurse anesthetists and CRNA educators increase a patient’s utility by allowing the individual to have pain-free surgeries and other invasive procedures resulting in more illness-free days. More significant is the indirect effect that CRNA educators have on a patient’s level of health stock by ensuring that qualified CRNA graduates are available to provide needed anesthesia services. An educator that produces 10 students per year for 20 years, each of whom delivers 750 anesthetics annually, indirectly increases the health stock and lifestyle of at least 1.5 million people. Until recently, healthcare edu-

cators produced practitioners for the healthcare system without regard to the principles that govern resource utilization and allocation in most other industries. With the publication of *To Err is Human: Building a Safer Health System*, in 1999, and *Crossing the Quality Chasm*, in 2001, the Institute of Medicine signaled a new era in healthcare quality and accountability, including practitioner education.<sup>9,10</sup> *To Err is Human* noted that medical errors were responsible for between 44,000 and 98,000 deaths annually.<sup>9</sup> These deaths occurred despite millions of highly skilled practitioners educated in US medical, nursing, and pharmacy schools, and the associated clinical education systems. As a result, in *Crossing the Quality Chasm*, there were recommendations for significant changes in the current healthcare education system to produce the needed multidisciplinary practitioner mix for the future healthcare system in the United States.<sup>10</sup>

## **Seven core principles of microeconomics**

Frank and Bernanke<sup>1</sup> present 7 core principles of economics that can be applied to analyze any situation from an economic perspective. The following discussion will show how nurse anesthesia educators can apply these principles to their programs and prepare for the possible changes suggested in the Institute of Medicine reports and maximize social welfare. All of these examples assume there is a budget constraint, that is, funding and/or time for education is limited.

1. **Scarcity principle.** Having more of one good thing usually means having less of something else.

*Example:* Students always want more of a certain type of case but are usually unwilling to give up a month of rotation A to get another month of rotation B due to limited

educational time. Another option would be to extend the educational program by a month, which students find equally unappealing.

2. **Cost-benefit principle.** (The term “cost effectiveness,” which avoids monetizing the value of health or life, is typically used in healthcare literature.) Take no action unless its marginal benefit is at least as great as its marginal cost.

*Example:* Is there an additional benefit received from using drug A instead of drug B? If so, is the additional benefit great enough to justify the additional cost of drug A compared to drug B? Gold et al is an excellent reference for CRNAs wishing to perform or apply cost-effectiveness analysis to their daily practice.<sup>11</sup>

3. **Principle of unequal costs.** Some costs (opportunity and marginal) matter when making decisions, while other costs (sunk and average) do not.

*Example:* The opportunity cost of adding additional students is not only the cost of the extra workload but also encompasses what a program director cannot do for all current and future students because of the money spent to expand the program. The marginal cost of adding 1 more student to the current 20 may include the cost of a major purchase, such as buying a high-fidelity patient simulator, because current clinical sites cannot provide the needed experience for an additional student.

Sunk costs are “lost money” (no refunds) and cannot be retrieved no matter what decision you make so they should not be part of the decision making process. Money spent last year on a patient simulator that is not usable this year should not enter this year’s budget discussion. Average costs do not matter because the marginal cost of adding that last student could be much higher than the average cost of adding a student.

If adding a student requires purchasing a high-fidelity patient simulator, the marginal cost of adding that student is the \$400,000 cost of the simulator, but the average cost of adding that student is only \$19,000 (\$400,000/21 students). Using the average cost instead of marginal cost would result in an incorrect decision about adding the student. Most programs would not add 1 student at a time, but marginal analysis requires calculating the additional cost to produce 1 additional unit of output or the additional gain from 1 additional unit of input.

**4. Principle of comparative advantage.** Everyone does best when each concentrates on the activity for which he or she is relatively most productive. The word "comparative" is the key to this concept.

*Example:* While few faculty members are good at everything; some are great at administration or lecturing, but poor at research, and ineffective at clinical education. Requiring faculty members or the program's director and associate director to do everything is not efficient. Letting each work within his or her most efficient (strongest) area requires the least amount of resources, allows each to get the work done efficiently, costs the least money and time, and frees up time, resources, and money for other activities.

**5. Principle of increasing opportunity costs.** Use the resources with the lowest opportunity cost before turning to those with higher opportunity costs.

*Example:* When choosing drugs to use in the clinical setting, if use of the most expensive drugs is always advocated, the additional cost may require delaying capital purchases such as a new fiberoptic bronchoscope. If the effect of the drugs is clinically similar, the cheaper drug

should be used, reserving the more expensive drug only when warranted or when the cheaper drug is unavailable. Money saved could then be used to provide care for additional patients or to buy needed resources such as the bronchoscope.

**6. Equilibrium principle.** A market in equilibrium leaves no unexploited opportunities for individuals but may not exploit all gains achievable through collective action.

*Example:* Free from external influences, a university can provide classes that meet the demands of students and not offer classes for which there is no demand. However, when a university is required to provide a diverse education and teach obscure topics in minimally attended classes, the university loses money. Working together, multiple universities could each provide some of the less demanded classes at a cheaper overall cost to society. Multiple anesthesia programs in close proximity could jointly offer certain courses and save each program, as well as society in general, money. Programs also could share and trade clinical experiences with other programs that have difficulty obtaining certain experiences.

**7. Efficiency principle.** Efficiency is an important social goal, because when the economic pie grows larger, everyone can have a larger slice.

*Example:* Instead of limiting who gets to do the few regional anesthetics being performed at present, patients and practitioners should be educated concerning the benefits of regional anesthesia and pain management services, thereby increasing the number of regional anesthetics being performed and providing more educational opportunities for all practitioners.

Applying these 7 broad principles to everyday decision making does not come easily to healthcare clinicians who prefer, appropriately so,

to focus on 1 patient at a time. However, by doing so, the many places in daily practice where both patients and the entire healthcare system could benefit by making some simple changes become obvious.

In Part 2 of this 2-part column, economic assumptions and other factors affecting the economics of nurse anesthesia education will be discussed.

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## AUTHORS

Cormac T. O'Sullivan, CRNA, MSN, is assistant director, Anesthesia Nursing Program, and adjunct assistant professor, College of Nursing, and doctoral student, Health Management and Policy, College of Nursing and College of Public Health, University of Iowa, Iowa City, Iowa.

Edward S. Thompson, CRNA, PhD, is director, Anesthesia Nursing Program, and associate professor, College of Nursing and College of Medicine, University of Iowa, Iowa City, Iowa.