

**AN ECONOMIC AND MEDICAL SPRINGBOARD:
EASTERN VIRGINIA MEDICAL SCHOOL**

**James V. Koch
Board of Visitors Professor of Economics
and President Emeritus
Old Dominion University
21 November 2007**

AN ECONOMIC AND MEDICAL SPRINGBOARD: EASTERN VIRGINIA MEDICAL SCHOOL

Executive Summary

Eastern Virginia Medical School (EVMS) is a growing economic powerhouse in Hampton Roads. It ranks among the top 25 non-federal employers in the region and has an annual economic imprint of more than \$711 million. A minimum estimate of the costs that the region would incur if EVMS did not exist is almost \$287 million, or \$179 per citizen in the region.

Even so, the impact of EVMS on our regional quality of life in general, and our quality of medical care in particular, may even be more significant. The presence of EVMS attracts highly qualified medical personnel who provide a menu of high quality medical care that otherwise would be beyond our grasp. Multiple EVMS faculty are involved in cutting edge translational research that immediately is reflected in improved patient care. Except for EVMS, approximately 90,000 patients would be forced to travel to other metropolitan areas to obtain appropriate medical care.

EVMS annually provides almost 100,000 young people with unbilled medical services that include counseling, vaccinations, and prevention. Approximately 7,500 key adults (parents, teachers) benefit from similar gratis services.

All things considered, the observation of a regional hospital executive that it would be “*disastrous*” for Hampton Roads if EVMS did not exist is very much on target. EVMS is the centerpiece of the region’s health care system.

I. BACKGROUND

Founded in 1973, Eastern Virginia Medical School (EVMS) always has enjoyed very strong ties to the Hampton Roads community. Indeed, the area’s cities provide financial support to EVMS and provide some of the members of its governing board.

The region’s devotion to EVMS recognizes that the medical school is the cornerstone of the region’s health care system. One-quarter of all the doctors in the region have some connection to EVMS, either because they are alumni of the medical school, or because they are involved in one of its many community-based, hospital, research, or teaching programs. More than 1,200 area doctors have adjunct, community faculty status at EVMS, including 256 in internal medicine and 135 in pediatrics.

Hundreds of thousands of area citizens utilize EVMS Health Services, which provides patient-centered health care. Except for EVMS, these individuals would have to travel to Richmond or more distant to obtain comparable care and as a consequence would bear considerable costs as they did so.

More than 60,000 K-8 students annually are served by EVMS faculty and staff associated with its Community Health program.

EVMS employs more than 1,500 individuals, ranking it among the top 25 non-federal employers in the region.

Even so, only a fraction of the region's citizens are aware of the economic powerhouse that EVMS has become. Its economic imprint now approximates \$711 million per year within the region. EVMS faculty and staff have been awarded 35 patents and 48 applications are pending. Licensing income from its discoveries has spurred and the institution ranked in the top dozen nationally this past year in this regard.

Nor are many of the region's inhabitants fully aware of the world class research and medical care that flows from EVMS. Led by Professor O. John Semmes, Director of EVMS' Virginia Prostate Center, EVMS has become one of 18 Biomarker Developmental Laboratories funded nationally by the National Cancer Institute. This immediately translates to superior medical care because one of Professor Semmes' focal points is the early detection of cancer and leukemias.

This report is designed to focus upon two aspects of EVMS. First, I calculate the economic imprint (impact) of EVMS on the region. Second, and related, I ask the questions, "What if EVMS were not here?" and "What would we do then?"

II. CALCULATING EVMS' ECONOMIC IMPRINT ON THE HAMPTON ROADS

EVMS' economic imprint on Hampton Roads can be subdivided into six categories: (1) the medical school's own budgeted expenditures and their effects; (2) the expenditures of EVMS Health Services and their effects; (3) the expenditures of students and residents and their effects; (4) the value of the gratis services provided by EVMS personnel to the region; (5) taxes paid by EVMS and its employees; and, (6) costs avoided by the region's citizens because of the existence of EVMS;

EVMS Budgeted Expenditures

During its 2007-2008 fiscal year, EVMS will spend the following amounts of money on personnel, supplies, contractual services and operating expenses (see Table 1):

TABLE 1

EVMS BUDGETED EXPENDITURES

Personnel		\$108,465,292
Salaries	\$90,734,585	
Fringe Benefits	\$17,730,707 (19.54%)	
Supplies		\$ 7,636,184
Contractual Services		\$ 23,924,376
Operating Expenses		\$ 26,022,966

EVMS currently employs 1,386 full-time individuals and 127 part-time individuals. Whereas the average compensation for a full-time employee in Hampton Roads is about \$45,000, EVMS provides average compensation of \$73,874 to its full-time employees (64 percent higher). True, this compensation number reflects the higher salaries of many medical doctors, but it also includes many health professionals, secretaries, janitors and individuals from other job classifications. It will suffice to note that average employee compensation at EVMS is almost two-thirds above the regional average. The medical school is a generous employer by regional standards. Table 2 discloses that EVMS is among the 25 largest non-federal employers in the region.

TABLE 2

**NUMBER OF EMPLOYEES AND RANKING OF NON-FEDERAL
FIRMS AND ORGANIZATIONS WITHIN HAMPTON ROADS**

<u>Firm or Organization</u>	<u>Number of Employees</u>	<u>Ranking Within Hampton Roads</u>
Northrup Grumman	19,000	1
Sentara Healthcare	14,500	2
Riverside Health System	5,487	3
Busch Gardens/Water Country	5,000	4
Bon Secours Health System	4,000	5

Bank of America	3,600	6
Smithfield Foods	3,223	7
Colonial Williamsburg	3,200	8
College of William and Mary	2,849	9
Chesapeake General Hospital	2,500	10
Value Options (FHC Health)	2,500	11
Smithfield Foods	2,500	12
SAIC	2,500	13
Norshipco	2,200	14
Cox Communications	2,100	15
WAVY-FOX-TV	1,919	16
AMERIGROUP Hampton Roads	1,900	17
Geico Direct	1,800	18
Manpower, Inc.	1,775	19
Canon Virginia	1,750	20
Landmark Communications	1,730	21
Old Dominion University	1,600	22
Eastern Virginia Medical School	1,513	23
Dominion Virginia Power	1,505	29
Anheuser-Busch	1,480	33
USAA	1,300	37

EVMS is a prolific purchaser of supplies of all kinds---paper, bandages, fluids, computer disks, food, uniforms, and the like. While the institution always is on the lookout for the lowest possible purchase prices consistent with its standards of quality, it makes a strong effort to buy supplies regionally and locally.

The medical school's expenditures on contractual services typically involve purchasing the services of people for tasks ranging from medical practice to buildings and grounds maintenance. Consultants also fall into this category of expenditures.

Operating expenses often consist of unavoidable items such as electricity and heating/cooling.

Student Expenditures

EVMS enrolls more than 700 students in its various academic programs. These students spend money within the region on tuition and fees, food, lodging, books, supplies, entertainment, travel, etc. For example, the estimated budget for a full-time, out-of-state, third-year medical student is almost \$70,000. Not infrequently, students remain in the region during the summer (either for classes or for work) and spend additional dollars then. One must also take into account additional student expenditures upon recreation and travel suggested by national survey data.

Note also that out-of-state students typically pay higher tuition than in-state students. Approximately one-third of students who aspire to the M.D. degree have out-of-state status, a distinction that costs them almost \$20,000 per year. However, this is new revenue brought into our region. An EVMS alumna M.D. who came to the region from New England was candid when she told me, *"I really had never heard of Hampton Roads before I applied to EVMS and didn't know about much more than the naval base and the beach. Now, I live here."*

Taking all student expenditures into account, and excluding tuition paid to EVMS (which already is included in the EVMS expenditure budget items listed in Table 1), students currently spend \$19.4 million annually within the region.

Construction Expenditures

Though EVMS has constructed buildings consistently throughout its history, it has not constructed an entirely new facility since the Brickell Library in 2000. A variety of rehabilitation and renovation projects currently are underway. I have approximated the annual average expenditure on these items at \$9.0 million.

Residents' Expenditures

Medical residents are individuals who already have earned the M.D. degree and now receive postgraduate medical training that may lead to certification in a primary care or referral specialty. They work under the direct supervision of more senior physicians.

EVMS currently hosts almost 320 residents, whose presence ordinarily is highly prized by hospitals because the availability of residents increases the quality of care provided, even while it permits them to economize on personnel dollars spent. EVMS budgets more than \$91,000 per resident; these expenditures already have been included in one or more of the categories outlined above. As noted in the next section, the presence of these residents provides support to Sentara Healthcare, Bon Secours, Children's Hospital of the King's Daughters and other hospitals within the region, as well as to EVMS Health Services. A hospital administrator acknowledged EVMS' positive effect on his hospital's ability to attract residents when he said, *"We would lose high quality residents without EVMS and, anyway, lots of them eventually chose to stay here and that really helps us out."*

Some portion of hospitals' ability to bill patients for treatment is owed to the presence of their residents. Hence, residents have a larger economic impact than the amount recorded in the EVMS budget and some of that additional impact appears on the bottom financial lines of the organizations where the residents are located.

However, it should also be noted that medical residents typically spend money within the region for personal and other purposes. These dollars are not included in the EVMS budget. Based upon conversations with residents, I have approximated these expenditures at \$15,000 per student per year. This generates an additional \$4,770,000 in spending within the region.

Gratis Community Services Supplied By EVMS

Public service is one of the most important tasks of a medical school and EVMS shines in this regard. EVMS personnel provide impressive amounts of unbilled public service to the Hampton Roads community. One of the EVMS units most involved in this regard is the Department of Pediatrics, which is located physically within the Children's Hospital of the King's Daughters. There, eight faculty are involved with disease prevention and health promotion within the community, most notably Professor Frances Dunn Butterfoss.

The unbilled services provided by these faculty range from asthma intervention and obesity reduction to promoting immunizations and helping place child booster seats in automobiles. Their overall focus is upon prevention by means of educating individuals and literally improving their behavior, but several of the activities (for example, immunization) require specific, traceable actions by the recipients.

The substantial unbilled public health service of these faculty is recorded in Table 3. Given the nature of these services, it is difficult to place a monetary value upon them. One is tempted to say many of these services are priceless because they may indeed rescue or save lives. By way of illustration, EVMS faculty have enrolled 18,000 uninsured young people for children's health insurance for which they were eligible, but simply had not enrolled. An elected official to whom I talked expressed his gratitude: *"These services reduce budgetary strain upon the Commonwealth, reduce medical bills,*

and improve the quality of the lives of lots of young people.” There is real economic value connected to such activities by EVMS faculty.

I have placed tentative estimates on the value of the direct intervention services to the average recipient, recognizing that some of the recipients may benefit more than others, while others may not be present and still others do not pay attention. I have valued each direct intervention contact with children at \$20 and each contact with adults at \$50, the latter estimate assuming that these individuals affect many other individuals besides themselves. These are conventional estimates for the cost-reducing effects of quality medical advice when that advice is dispensed to large groups of people. The result is an estimated value of \$4.04 million in reduced medical costs resulting from EVMS faculty interventions. Reflection suggests this is a lower bound estimate. If only one life is saved by the interventions, then by conventional economic valuations utilized by the U.S. Government, this life alone would be worth more than \$3.0 million.

TABLE 3

UNBILLED, GRATIS PUBLIC HEALTH SERVICE PROVIDED BY EVMS PEDIATRICS FACULTY

Direct Interventions (providing services, counseling, educational programs):

- 7,382 preschool children under age 5
- 18,614 children ages 3-19
- 60,000 students grades K-8
- 8220 students grades 9-12
- 1089 nurses physicians & allied health professionals
- 1556 parents
- 3650 teachers & administrators
- 1200 child care providers

Public Awareness Efforts:

- 484,000 children in grades K-12
 - 65,000 children under age 5
 - 40,000 parents
 - 1.5 million people in the WHRO, WTKR, WAVY and WVEC radio/television media markets
-

EVMS Health Services

EVMS Health Services is a not-for-profit foundation affiliated with EVMS that currently provides patient care to more than 355,000 individuals annually. The faculty

and staff of EVMS are the major providers within EVMS Health Services and Dr. L.D. Britt, the Brickhouse Professor of Surgery and Chairman of the Department of Surgery at EVMS, is the President of EVMS Health Services. James Lind is the CEO of EVMS Health Services.

Consider a world in which EVMS did not exist and hence EVMS Health Services did not exist. This would impose major costs on the citizens of the region in the form of patients who would have to be served elsewhere, revenues lost to the region, and expenses incurred by patients who would have to leave the region for treatment. I will provide estimates of each of these.

This year, the 355,000 patients will be billed \$83,500,000 for services and care received from EVMS Health Services, though EVMS Health Services believes it will collect only \$43.0 million of this amount. This reflects a variety of factors, including the reality that some of the patients served do not have the ability to pay. **If EVMS did not exist and EVMS Health Services did not exist, then the \$40.5 million of uncollected billings for services supplied by EVMS Health Services would instead have to be supplied by area hospitals (Sentara, Bon Secours, Children's Hospital of the King's Daughters, Chesapeake General, etc.) unless these hospitals chose to turn these patients away. Assuming that few if any of these patients were turned away, then this would impose a huge financial burden on area hospitals.** Hence, the existence of EVMS and EVMS Health Services saves the region's hospitals a considerable amount of money.

If EVMS and EVMS Health Services did not exist, then paying patients would have to seek care elsewhere. Based upon conversations with EVMS faculty and EVMS Health Services personnel, I have assumed that one-half of these paying patients would be forced to drive outside the region to obtain the medical care (often specialist) they require. A local physician told me, *"Several important medical care specialties realistically are dependent upon EVMS faculty. If the faculty aren't here, then these specialties aren't here."*

There would be two financial effects associated with the disappearance of specialty medical care now being received by paying patients. First, this would remove a significant source of spending from the region (approximately \$20.25 million annually) and it would require the migrating patients to expend resources to be treated in Richmond, Washington, DC, Raleigh-Durham, or wherever. Once again, based upon conversations with EVMS faculty and staff, I have approximated the travel/maintenance costs at a conservative \$750 per migrating patient/patient family per migration visit.¹ Assuming a proportional distribution of the 355,000 patients across each of these segments (that is, 88,750 patient visits outside of the region must occur annually, many involving multiple

¹ EVMS personnel pointed out that the variability of the cost of out-of-town medical visits would be substantial. Some patient visits to other metropolitan areas would require incurring much more expense than gasoline money plus a meal or two, while other visits involving specialists and chronic problems would require family stays of several weeks. The average, they suggested, might well be more than \$750 per patient visit. I have chosen to be conservative.

visits by a single individual), this results in an annual estimated medical migration cost of \$66.6 million.

Once again, this exercise assumes that EVMS does not exist and therefore EVMS Health Services does not exist. There seems little doubt that there are many other costs the region would incur if EVMS did not exist. Consider that approximately one-quarter of all doctors within the region have some relationship with EVMS, either because they are a graduate, or a community faculty member, or otherwise. It is entirely plausible that some of these highly skilled professionals would not be in Hampton Roads except for the medical school and that the quality of care received by the region's residents would be measurably lower. I have not attempted to quantify these costs except for the exercise above relating to EVMS Health Services where numbers of patients, specialties and billings are known.

Summarizing the Economic Imprint of EVMS Prior to Economic Ripple Effects

Table 4 summarizes the economic influences I have discussed above *prior to any economic ripple effects* of EVMS' expenditures throughout the Hampton Roads region. The total economic imprint of EVMS is \$330.05 million, of which \$131.19 million consists of costs that the region would incur if EVMS (and consequently EVMS Health Services) did not exist.

TABLE 4

**ANNUAL ECONOMIC IMPRINT
OF EASTERN VIRGINIA MEDICAL SCHOOL
UPON HAMPTON ROADS PRIOR TO ECONOMIC RIPPLE EFFECTS**

Personnel	\$108.47 million
Supplies	\$ 7.64 million
Contractual Services	\$ 23.92 million
Operating	\$ 26.02 million
Students (net of tuition already included)	\$ 19.04 million
Residents (net of sums already included)	\$ 4.77 million
Construction	\$ 9.00 million
If EVMS Did Not Exist	
Gratis Services Supplied	\$ 4.04 million

Uncollected Billings for Care Costs Transferred to other Providers	\$ 40.50 million
Lost Collected Revenue	\$ 20.25 million
Patient Migration Costs	\$ 66.60 million
Total	\$330.25 million

III. ECONOMIC RIPPLE EFFECTS

EVMS, its students and its residents spend money throughout the region on nearly every good and service the region sells---food, automobiles, computers, newspapers, furniture, clothing, utilities, entertainment, etc. The businesses that make these sales do not hoard these dollars. They use these dollars to purchase many of the same items, but especially they use these funds to pay wages to their own employees. Those who receive these dollars do likewise and a multiplier process is created. This is the economic “ripple effect,” so named because an initial expenditure (perhaps by EVMS) creates a widening ripple effect throughout the regional economy just as rock thrown into a lake generates a ripple that expands and eventually disappears.

Economic ripple effects don’t go on forever. To the extent that dollars are spent outside of Hampton Roads, the ripple begins to ebb and will vanish. While no one can predict precisely where an individual or a business will spend dollars they receive, when large numbers of individuals (such as the 1.6 million residents of Hampton Roads) are involved, it’s possible to make more precise predictions about the size of any economic ripple effects connected to expenditures.

Table 5 reports the multipliers I have attached to various categories of EVMS expenditures. Larger multipliers reflect the probability that these EVMS expenditures will result in larger further expenditures within the region, while smaller multipliers suggest the opposite. In general, compensation payments tend to have larger multipliers than expenditures on supplies and equipment because many of the latter expenditures are made outside of the region.

The bottom line, however, is that these multipliers determine the size of the economic ripple effect. That is, the multipliers determine how significant any subsequent rounds of expenditures will be after EVMS has started the process.

TABLE 5

**MULTIPLIERS USED ON EVMS EXPENDITURES
AND SOME OF THE COSTS AVOIDED**

<u>Class of Expenditure</u>	<u>Multiplier</u>
Personnel	2.3
Supplies	1.8
Contractual Services	1.8
Operations	1.8
Students	2.3
Residents	2.3
Construction	1.9
Gratis Services Supplied	1.6
Uncollected Billings Care	2.2
Reduced Paying Care	2.2
Patient Migration	2.2

These multipliers permit me to estimate the overall economic imprint of EVMS in the Hampton Roads region. “Imprint” is the appropriate noun because these multipliers will be applied both to EVMS’ direct expenditures and to the additional costs the region would incur if EVMS did not exist.

Table 6 combines the expenditure and cost data reported in Table 4 with the expenditure multipliers listed in Table 5. The result is the economic imprint of EVMS once the economic ripple process has been completed. **Note that the annual economic imprint of EVMS on Hampton Roads is more than \$711 million. Equivalently, this is \$444 for every citizen in the region. Many are the individuals within our region who know relatively little about EVMS, but nonetheless owe a substantial portion of their existence and prosperity to the medical school.**

TABLE 6

**ECONOMIC IMPRINT OF EASTERN VIRGINIA MEDICAL SCHOOL
INCLUDING ECONOMIC RIPPLE EFFECTS WITHIN HAMPTON ROADS**

<u>Category</u>	<u>EVMS Amount</u>	<u>Multiplier</u>	<u>Regional Economic Imprint with Ripple Effect</u>
Personnel	\$108.47 m.	2.3	\$249.48 m.
Supplies	\$ 7.64 m.	1.8	\$ 13.75 m.
Contractual Services	\$ 23.92 m.	1.8	\$ 43.06 m .
Operating	\$ 26.02 m.	1.8	\$ 46.84 m.
Students (net of tuition already included)	\$ 19.04 m.	2.3	\$ 43.79 m.
Residents (net of sums already included)	\$ 4.77 m.	2.3	\$ 10.97 m.
Construction	\$ 9.00 m.	1.9	\$ 17.1 m.
If EVMS Did Not Exist			
Gratis Services Supplied	\$ 4.04 m.	1.6	\$ 6.46 m.
Uncollected Care Costs Transferred	\$ 40.50 m.	2.2	\$ 89.10 m.
Lost Collected Revenue	\$ 20.25 m.	2.2	\$ 44.55 m.
Patient Migration Costs	\$ 66.60 m.	2.2	\$146.52 m.
Total	\$320.25 m.		\$711.62 m.

IV. TAXES PAID BY EVMS EMPLOYEES

While virtually all of EVMS' activities are tax exempt, the same is not true for its employees. They pay a variety of taxes to local and regional governmental units. The most important of these are real estate taxes and sales taxes. These taxes already have been counted in the personnel expenditures noted above. That is, EVMS employees utilize the incomes they earn from EVMS to pay these taxes and these already are included in the data reported above in Table 6.

Nevertheless, it is useful to show that the local and regional taxes EVMS employees pay are considerable. Table 7 provides these data. **On annual basis, EVMS employees generate \$2.65 million in real estate taxes and \$5.24 million in sales taxes (the latter number takes into account the economic ripple effect), for a total of \$7.89 million of annual local tax payments. This number does not take into account license taxes and the like that EVMS employees also pay.**

The real estate tax estimate assumes that 73 percent of EVMS employees own a home and pay real estate taxes; the regional home ownership average for households is 75 percent. Each home is assumed to be assessed at \$240,000, the current regional average home sales price. The tax rate is assumed to be \$1.00 per \$100 of assessed valuation.

TABLE 7

ANNUAL LOCAL TAXES PAID BY EVMS EMPLOYEES

Real Estate Taxes (1,104 households at average assessed value of \$240,000 and tax rate of \$1.00 per \$100 of assessed value)	\$2.65 million
Sales Taxes Remitted Locally (2.1 percent effective rate taking into account education remittances from the Commonwealth that are based upon sales tax revenues)	\$5.24 million
Total	\$7.89 million

I have utilized an effective sales tax remittance rate to localities of 2.1 percent. This takes into account payments such as K-12 education support from the Commonwealth that are based upon sales tax collections.

V. IF EVMS DID NOT EXIST

What if EVMS did not exist? This would be “*disastrous for Hampton Roads*” (the assessment of a hospital executive) because EVMS is the center piece of the region’s health care system. Both the quantity and the quality of health care would deteriorate significantly.

However, if EVMS did not exist, there also would be significant economic costs imposed upon the region. Table 8 takes into account economic ripple effects and estimates the costs that would be imposed upon the region if EVMS and EVMS Health Services did not exist.

TABLE 8

**SPECIFIC ECONOMIC COSTS THAT WOULD BE INCURRED
BY HAMPTON ROADS IF EVMS DID NOT EXIST
(INCLUDES ECONOMIC RIPPLE EFFECT)**

Value of Gratis Care Supplied	\$ 6.46 million
Cost Of Uncollected Care Borne By Other Medical Providers In Hampton Roads	\$ 89.10 million
Lost Medical Revenue From Paying Patients at EVMS Health Services	\$ 44.55 million
Patient Migration Costs Incurred By Patients Forced to Travel to Health Providers In Other Metropolitan Areas	\$146.62 million
Total	\$286.63 million

It is fair to say that \$286.63 million, the financial cost incurred by citizens of the region if EVMS did not exist, represents a lot of money by any standard ---\$179 annually per person living in our region. If the region’s citizens and governmental had a more complete understanding of this financial reality, they might well be generous in their support of EVMS and its needs.

Nevertheless, the residents of Hampton Roads might well feel other impacts as much or more than this financial impact if EVMS did not exist. Those receiving medical care would immediately notice several adverse developments. First, they probably would find it difficult to obtain an appointment because medical doctors would be in scarce supply. **The reality is that without EVMS, Hampton Roads would be the most populous metropolitan area in the United States not to be served by a local medical school.** The local doctors who have graduated from EVMS would not be available and it would be quite expensive to attract replacements. National data suggest that regions without medical schools usually do not succeed in attracting the number of doctors they need. An experienced M.D. who recently moved to Hampton Roads expressed the relationship this way: *“The existence of a medical school and the skilled professionals medical schools attract provide a signal to other doctors about the quality of medical care and their ability to maintain a high level practice.”*

Second, without EVMS, the quality of medical care would decline because many of the individuals who provide that care would not be present. These personnel would of course include medical doctors produced or attracted by EVMS, but also would include medical residents, nurses, physical therapists, etc., who are produced or attracted by EVMS. To be sure, many of these individuals would be present if EVMS were not in Hampton Roads, but based upon the experience of other regions, a non-negligible number would opt to live and work in other regions, thus lowering the quality of medical care in the region. In the words of a hospital administrator, *“Without EVMS, we’d always have to struggle to attract and retain critical personnel.”*

Third, the absence of EVMS researchers would mean that patients would not have access to cutting edge medical knowledge and techniques. I’ve already cited Professor Semmes’ translational research work on the early detection of cancer. His research directly and immediately improves the quality of care available to the region’s citizens in a health care area (cancer detection and treatment) that affects tens of thousands of individuals in the Hampton Roads. Add to Professor Semmes the dozens of EVMS researchers who work in areas such as maternal/fetal medicine, high risk pregnancies, reproductive medicine and infertility (where Professor Sergio Oehninger is particularly well-known for his research), diabetes (where Professor Aaron I. Vinik has assembled an impressive record), ocular pharmacology, aging and trauma.

Consider the sterling example of Professor Alfred Z. Abuhamad, Mason C. Andrews Chair of the Department of Obstetrics and Gynecology and Associate Dean for Clinical Affairs at EVMS. Much of his research focuses on high risk pregnancies. Each year, more than 600 mothers with high risk pregnancies are transferred to EVMS. Without EVMS, the lives of both these mothers and their children would be in great danger. They receive state of the art care because of the presence of Professor Abuhamad and his colleagues.

Fourth, if EVMS did not exist, then the patients just noted would be forced to leave the region and travel to other metropolitan areas such as Richmond and

Washington, DC in order to receive treatment. I've already noted some of the economic costs associated with this unattractive alternative, but I now add the possibility that some Hampton Roads patients would not survive such travel and when they arrived at their remote destination, might not receive the cutting edge care they now receive in Hampton Roads. At the least, their friends and relatives would find this an expensive and unattractive alternative.

Fifth, EVMS faculty and EVMS Health Services are heavily involved in the region's provision of trauma care. Thousands of individuals within the region utilize the region's trauma care facilities annually as a result of automobile accidents, gunshot wounds, heart attacks and strokes, allergic attacks, poisonings, and the like. **As one local M.D. put it to me, "Without EVMS, we'd be in sad shape in the area of trauma care. There's no doubt that the quality of care would really decline and some patients would have to be transported to other regions."** Another said to me, *"This is a matter of life and death. EVMS is the reason we have such excellent trauma care in the area. What we're talking about here is some patients dying, or having life-long problems if the medical school did not exist."*

Sixth, EVMS research often proceeds to the development stage and later to commercialization. Arguably the most well-known research connected to the medical school has been generated by the Jones Institute for Reproductive Medicine. Since its founding in 1978, the Jones Institute has focused on fertility problems. Pioneering scientists Drs. Georgeanna and Howard Jones guided the first *in vitro* fertilization resulting in birth in the United States in 1981. Jones Institute research was the foundation for the patented oral contraceptive SEASONALE™, which has generated significant revenue for the Institute and the medical school.

Eyerx Research, a Norfolk-based firm in which four EVMS faculty are principals, was founded to develop new technologies to prevent and treat blindness and has entered into a licensing agreement with EVMS for an innovative treatment to treat a debilitating eye conditions.

A very promising arena for future research, development and commercialization associated with EVMS is modeling and simulation. In 2001, the National Center for Collaboration in Medical Modeling and Simulation was established with EVMS and Old Dominion University as the major partners. The major goal of the Center is to improve the quality of medical care being provided to American military forces, but it is apparent that the entire American medical system could benefit from the Center's activities. EVMS is a key player in the burgeoning regional modeling and simulation activities that have centered in Suffolk.

One specific area of emphasis for the Center is the development of new medical simulations. A "virtual pathology stethoscope" has been invented by a team of researchers from EVMS and ODU and the result has been licensed to a Texas-based

company, Cardionics Inc., which manufactures medical diagnostic and teaching equipment. The virtual pathology stethoscope can simulate the sounds of a human body's circulatory and respiratory systems and is a training device for medical personnel.

Another area of emphasis for the Center is the development of a regional medical preparedness simulation for Hampton Roads. Alas, the range of medical problems and even medical catastrophes that could hit the region has expanded dramatically in recent years and the Center is actively involved in simulating these challenges and thereby helping various levels of government prepare our regional response.

In sum, EVMS professionals are intimately involved in research (approximately \$40 million of external funding annually), and in the development and commercialization of that research. These are activities that attract substantial outside funding to the region and generate attractive jobs.

VI. FINAL OBSERVATIONS

It is possible to express EVMS' economic imprint on Hampton Roads as a number (about \$711 million annually). While this is an impressively large number, it does not begin to capture the tremendous contribution the medical school makes to the welfare of the region. Our quality of life (and sometimes our actual lives) depend upon the good works of EVMS. All of us are enriched by the presence of EVMS. It is not for nothing that the founding of EVMS in 1973 is regarded by many as the most significant single event in our region's history in the second half of the 20th century.

