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## Commentaries

# How Can You Be Two Places At Once When You're Not Anywhere At All?

### THIS TITLE IS A QUOTE FROM THE FIRESIGN

Theater, a comedy group in the 60's that appealed to the drug culture of baby boomers. It came to mind when I reviewed a couple of evaluations of patients I had seen, who had gone, at my suggestion, to another center for another opinion, from people who subspecialized within my own field of movement disorders. The notes on both patients seemed to have missed the mark. The neurological exam in movement disorders, as is true in much of neurology, is the crucial bedrock on which all else depends. Unlike other areas of medicine, or even in much of neurology, the history is less important than the exam. Like dermatology, what you see is what you get. After all, dizziness, clumsiness, imbalance are words so imprecise that they should not be used in medical presentations except when quoting the patient.

My two patients, who walk like they're drunk, are described as having a narrow based gait, mildly unsteady. Their limb ataxia is minimized to the point where it can be overlooked. The importance of various findings are given, to my mind, the wrong set of weights. Ataxia is minimized, akinesia exaggerated, instead of vice versa. In the area of movement disorders classification is everything. It's like classifying a murmur prior to the era of echocardiography, when findings on the physical exam had some meaning, and might even determine treatment.

So, what am I to make of a super-specialty clinic where the role of the quaternary consultation appears to be ordering as many tests as possible? Why do we refer to specialists? In some cases it is pro forma, perhaps even legal in its underpinnings, making sure that there isn't an incorrect diagnosis, that the management is acceptable, that in case of error there won't be recriminations. But most referrals are made for the patient's benefit. Someone who specializes should know more about

a disorder than the person who does not specialize. But what if the specialist really specializes in the basic science aspects of the illness rather than the human form? What if the referring doctor actually sees more patients with the disorder than the super-specialist who spends one half day/week in clinic during the weeks he's not travelling?

Can you be a clinical specialist if you spend only a half a day a week seeing patients? I am coming to think not. And I say this as a sub-specialist, not excluding myself from criticism. Of course, I also say this as a clinician who spends almost all day, every day seeing patients.

Many years ago, when I still saw general neurology patients and did in-patient consultations every other month, I gave a talk at a fairly distinguished medical center. After the talk a case was presented that centered on the neurological complications of bacterial endocarditis. Since this was a topic I dealt with frequently, at least as a possibility on the differential diagnosis list, I was fairly well educated on the topic. I was amazed though by how many of these distinguished, well known authorities in other neurological fields, were not. While there is an expected trade off between being a jack of all trades and being a master of one, one hopes that the "master" would restrict his authority in discussions to the discipline mastered, and not the ones left fallow. Every university medical center is run by subspecialists. They are, hopefully specialists, like cardiologists, who subspecialize in rhythm disturbances, or congestive failure, ischemia, or transplantation, but are also knowledgeable about cardiology problems in general. But what would an internist, or a cardiologist, think of the cardiologist who specializes in right heart failure and who sees patients only one half day/week? A busy academic cardiologist may see more of these patients in a typical week than the subspecialist. Can one be a clinical expert with limited experience?

The answer is yes but it makes me uneasy. Those of us who see a lot of patients "learn" from experience. We develop a clinical sensibility, we think, try constantly to revise this clinical sense, sharpen it, re-think it when we see cases that don't fit. But when the cases are few, we lose the strop that sharpens the razor. Especially so when we see a patient once or twice and send them back whence they came, losing the long term follow up.

I once invited a distinguished, justifiably famous, colleague to give neurology grand rounds. I think he's one of the best clinicians in my field in the world. I presented cases in which I was unable to make a diagnosis. He quickly diagnosed the first two cases as having progressive supranuclear palsy (PSP), which made my jaw drop (along, I think, with my reputation). I probably had seen more cases of this than him and I had not overlooked this diagnosis, but he had been convinced by a paper he read that a particular type of dysarthria was virtually diagnostic of PSP. Of course, his job was to make a diagnosis, if he could, and I got to follow the patients, neither of whom blossomed into typical PSP. Had my friend followed these patients he would have altered his diagnosis, I believe, but he was visiting, and rendering a teaching exercise. The specialist who has only limited clinical experience cannot learn from mistakes. They don't happen when you don't have time for follow ups. And even one's examination, the soul of neurology, apparently deteriorates.

— JOSEPH H. FRIEDMAN, MD

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# A Heart-Beat Is Amplified and Then Resonates In History

**SOME YEARS HAVE BEEN JOYOUS, OTHERS TERRIFYING. THE TRYING ONES** are witness to terrible happenings, whether natural or contrived by man. During the congenial years, in contrast, humans are not evicted from their homes, farm lands not plundered, plagues are confined to Sunday prophesy, and most civilians die peacefully of old age. Sometimes, however, historians cannot decide whether a particular year is good or bad until viewed centuries hence.

The momentous years are crowded with meaningful events that impinge, without permission, upon the lives of the many. The effects of some, such as the 1914 through 1918 interval, are immediately apparent and their date of onset, are precisely known. Other social convulsions, such as the onset of the industrial revolution, cannot be assigned to one particular day or one special location. It is not as though an 18<sup>th</sup> Century English worker whispers to his fellow toiler, “When we finish our labors this evening, Nathaniel, let’s stop off at the local tavern for a glass of ale to celebrate the morrow’s onset of the Industrial Revolution.”

Historians agree: some years witness startling happenings while others experience little more than the continued progressions and regressions of ongoing socioeconomic trends. But then there are years, truly peaceful intervals, with little apparent drama or turmoil; and yet, hidden somewhere in the historic fabric of those allegedly quiet years may have been an event which was recognizably epochal – but only when examined by historians centuries hence.

Consider, for example, the relatively tranquil year of 1816. James Madison of Virginia was in his second term as president; Charles Darwin was a seven year old Shropshire lad pondering whether to become a physician, a naturalist or a clergyman. John Keats, a 21 year old London medical student debated with himself whether to seek a life as a physician or complete a poem called *Endymion*. And the Rhode Island Medical Society was but four years old.

A 35 year old physician, Rene Theophile-Hyacinthe Laennec, practicing his clinical craft at the Necker Hospital in Paris, worries deeply about a new patient who may – or may not – be suffering from early heart disease. Physical examination, in those days, was rarely undertaken since contact with one’s patient was considered unseemly. And if, on rare occasions listening to a physiologically troubled heart was required, the physician placed a silk kerchief upon the skin of the patient’s chest and then placed his ear upon the silk to discern the sounds – normal or abnormal – of the patient’s heart. But because of this patient’s obesity, Laennec refrains from listening to his patient’s heart in the usual manner. But then remembering his hobby at a flautist (and the remarkable transmissibility of sound through tubular wood), he rolls up a piece of heavy paper allowing him hear the patient’s heart sounds with greater clarity. And for the next decade he improves upon the instrument – he calls it a stethoscope – and correlates the many abnormal cardiac sounds with sundry underlying organic diseases. A new science has been born.

The single, rigid wooden tube has since been supplanted by a binaural instrument equipped with flexible rubber tubing. This fundamental diagnostic tool was the first of a succession of portable instruments employed to examine the body and its orifices. These tools as well as those equipped to measure temperature and blood pressure, collectively transformed diagnostic medicine from the art of observing the patient from afar, to a more dynamic process of intruding, usually painlessly, into the inner dynamics of the body’s organs so as to infer the physical nature of the underlying pathological process. Laennec’s inaugural instrument gave credence to the new concept of inner illness as organic malfunction culminating in structural changes of a distinctive character; that these singular organic changes may then be recognizable; and further, that a physician might discern the *nature* of these pathological changes by meticulous physical examination – augmented now with instruments such as the stethoscope.

Medicine now entered a new and more diagnostically assertive domain: the identification of specific diseases by tell-tale diagnostic signs revealed by instruments. The 20<sup>th</sup> Century would then bring to medicine imaging technics exploiting the use of X-rays, electrophysiological diagnostic tools such as the EKG machine, and the biochemistry laboratory to analyze the patient’s body fluids such as serum and urine. But all of these elegant, revelatory instruments required a beginning – and that beginning was Laennec’s simple wooden tube. The crude, intuitive art of medicine was then transformed into a more exacting science.

– STANLEY M. ARONSON, MD

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The author and his spouse/significant other have no financial interests to disclose.

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# Effects of Erythropoietin Stimulating Agent (ESA) Automated Adjustment Protocols On Hemoglobin Levels and Mortality In End Stage Renal Disease Patients

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**ANEMIA IS A COMMON FINDING AMONG** patients with chronic kidney disease (CKD) and end-stage renal disease (ESRD). Data from National Health and Nutrition Examination Survey (NHANES) demonstrated a prevalence of anemia in 1.3%, 5.2%, and 44.1% among patients with stage III, IV and V CKD respectively.<sup>1</sup> It is associated with a higher risk of cardiovascular and renal events, and its prevalence and severity increase with worsening renal function.<sup>2</sup> Anemia in CKD is mostly related to the reduced endogenous production of erythropoietin by the peritubular capillary endothelial cells in the injured renal parenchyma.<sup>1,3</sup>

The pathogenesis is not complete understood, but in animal models the kidney production of erythropoietin was increased by the anemia mediated by hypoxia-inducible factor (HIF).<sup>4</sup> HIF binds to the erythropoietin receptor (EpoR) on the red cell surface and activates a Janus-Kinase 2 (JAK2) cascade. This receptor is also found in a large number of tissues which activate intracellular biological pathways upon binding with erythropoietin.<sup>5</sup>

Anemia treatment and the target hemoglobin level remain a controversial topic not only in chronic kidney disease but also in patients with coronary artery disease (CAD) and cancer patients.<sup>6,7</sup> In CKD patients several recent studies reported no benefit in having patients achieve a high hemoglobin (target >13 g/dL). Two clinical trials published in 2006 evaluated anemia correction management in CKD patients found no evidence that achieving higher hemoglobin targets was beneficial; in fact it had worse outcomes.<sup>8,9</sup> The Trial to Reduce Cardiovascular Events with Aranesp (TREAT) study, published in 2009, reinforced data reported in previous CKD trials investigating optimal methods to manage anemia. There was no benefit for composite cardiovascular events endpoint but an increase risk of stroke.<sup>10</sup> The

cumulative evidence in the literature in anemia management in CKD patients supports the findings of the Normal Hematocrit Study (NHS) conducted in ESRD patients in 1990's which showed no benefit and a potential harm with increased mortality in patients randomized to the higher hemoglobin group.<sup>11</sup>

We conducted a retrospective observational cohort study to test the hypothesis that treatment protocols designed to lower hemoglobin levels in dialysis patients would be associated with lower hemoglobin levels and a concomitant decrease in overall mortality.

## MATERIAL AND METHODS

We conducted a retrospective observational cohort study in over 7,188 hemodialysis patients in 120 dialysis units at Diversified Specialty Institutes (DSI) Renal Inc. facilities in the United States from September 1, 2006 to March 31, 2008. Data was collected for health care purposes using the PEARL-Electronic Medical Record (EMR) computer program. The PEARL program is a computer based interface with the DSI computerized patient record data system designed to aid dialysis units, nephrologists and the advisory board with dialysis operations and patient safety quality assurance projects. The central DSI review board approved the study cohort and all data was de-identified to maintain patient's confidentiality. Inclusion criteria required that all patients had at least one monthly dialysis adequacy laboratory panel obtained in the outpatient dialysis setting and were

Medicare beneficiaries during September 2006 to March 2008.

## DATA

The blood samples collected from patients were transported to the DSI central laboratory. Hemoglobin was measured using peak absorbance of cyanomethemoglobin by spectrophotometer. Erythropoietin stimulating agents (ESAs) were given intravenously weekly in hemodialysis section and based on a weight based protocol. Mortality was identified via the DSI central computer (PEARL) data registry. Death certificates were certified by the unit charge nurse and nephrologist.

Dialysis quality assurance data, dialysis adequacy data, laboratory data collected included: Chemistry (Albumin, potassium [K]), dialysis adequacy (Kt/V, URR %), Anemia, (hemoglobin average, percent of patients with hemoglobin <11/dL, hemoglobin 11-13/dL and hemoglobin >13/dL, Ferritin, Reticulocytes Count and % Iron Saturation), Bone Metabolism (Ca, PO<sub>4</sub>, PTH) and Diabetes (HbA1C). These aggregated data were collected monthly.

## STATISTICAL ANALYSIS

Data was confirmed by PEARL online chart review for outliers and log

**Table 1: DSI Renal Anemia ESA Protocol**

### DSI Renal ESA Hemoglobin Protocols:

- A (Pre-FDA) September 2006 to April 2007  
**Hold ESA** if Hgb>13.3 g/dL  
**Resume ESA** if \* Hgb<13.00 g/dL  
**Target** 12-13 g/dL
- B (Post-FDA) May 2007 to August 2007  
**Hold ESA** if Hgb>12.5 g/dL  
**Resume ESA** if \* Hgb<11.75 g/dL  
**Target** 11-12 g/dL
- C (Modified ‡) September 2007 to March 2008  
**Hold ESA** if Hgb>13.0 g/dL  
**Resume ESA** if \* Hgb<12.50 g/dL  
**Target** 11-12 g/dL

\* Resume ESA at 2 levels below the current dose

‡ Modified to optimize target 11-12g/dL

transformed for analyses of non-normally distributed data. We compared hemoglobin levels by protocol time using ANOVA, Kruskal-Wallis. We compared the crude mortality rates by protocol time using

ANOVA. Mortality data analyzed as a number and evaluated as percentage for a specific protocol. Comparisons were made among three groups; the original erythropoietin anemia protocol-A (Sep-

tember 2006 to April 2007 [pre-FDA]), protocol-B (May 2007 to August 2007 [post-FDA]) and protocol-C (September 2007 to March 2008 [modified to optimize hemoglobin target to 11–12 g/dL]). (Table 1) The intent of protocol-B was to reduce the % of dialysis patients with hemoglobin >13g/dL and the modified Protocol C to lower the number of patients that were below target. We also compared anemia on protocol A (pre-FDA) to protocols B and C together since they both had a hemoglobin target of 11-12 g/dL. Mortality data was analyzed as a number and evaluated as percentage for a specific protocol.

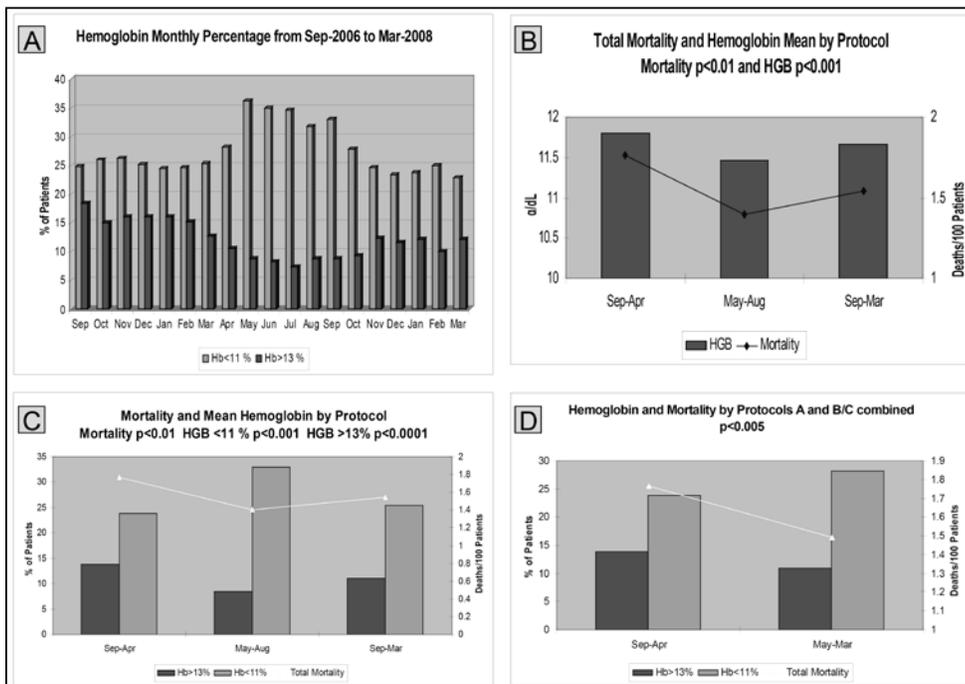
**Table 2. Laboratory characteristics of study cohort by protocol time**

| Characteristic      | Protocol A | Protocol B | Protocol C | P-value (ANOVA) |
|---------------------|------------|------------|------------|-----------------|
| Mean Hgb (g/dL)     | 11.80      | 11.45      | 11.66      | <0.001          |
| Hgb < 11g/dL%       | 23.82      | 33.01      | 25.46      | <0.001          |
| Hgb > 11-13 g/dL%   | 64.38      | 55.54      | 62.88      | <0.001          |
| Hgb >13 g/dL%       | 13.84      | 8.38       | 11.03      | <0.0001         |
| Iron Saturation (%) | 29.39      | 30.46      | 28.89      | <0.005          |
| Ferritin (mg/dL)    | 619.58     | 619.78     | 624.31     | 0.9             |
| Reticulocytes (%)   | 2.02       | 2.08       | 1.98       | 0.22            |
| Albumin (g/dL)      | 3.74       | 3.72       | 3.73       | 0.045           |
| Potassium (meq/L)   | 4.82       | 4.80       | 4.84       | 0.39            |
| Phosphate (mg/dL)   | 5.44       | 5.41       | 5.50       | <0.01           |
| Calcium (mg/dL)     | 9.35       | 9.37       | 9.31       | 0.39            |
| PTH (pg/ml)         | 396        | 397        | 399        | 0.95            |
| Kt/V                | 1.74       | 1.57       | 1.40       | 0.002           |
| URR %               | 74.14      | 73.6       | 73.02      | 0.003           |
| HBA1C (%)           | 6.84       | 6.95       | 6.98       | 0.53            |

## RESULTS

The characteristics of the cohort by protocol are shown in Table 2. There were approximately 7,188 monthly hemodialysis patients included in the analysis. There were significant differences between protocols. The mean hemoglobin levels varied by protocol: A: 11.80 g/dL, B: 11.45 g/dL and C: 11.66 g/dL (p=0.001) by ANOVA. (Table 2 and Figure 1a) The percentage of patients with hemoglobin <11 g/dL differed by protocol: A: 24%, B: 33% and C: 25% (p=0.001). (Table 2 and Figure 1a) The percentage of patients with hemoglobin >13g/dL differed by protocol: A: 14%, B: 8%, and C: 11% (p=0.0001). (Table 2 and figure 1a) There were also significant differences in percent iron saturation, albumin, inorganic phosphorus, **urea reduction ratio (URR)** and **kT/v** between the three protocol times. (Table 2)

The mortality characteristics of the cohort by protocol time are shown on Table 3 and in Figures 1b and 1c. Overall monthly mortality rate (deaths/100 patient-months) differed by protocol time: A: 1.77, B: 1.40 and C: 1.54 (p=0.01). (Figures 1b and 1c) There was a statistically significant 21% decrease in mortality from protocol A to protocol B and a statistically significant 17 % decrease in mortality between protocol A to combined protocols B and C (p=0.005). (Figure 1d)



Figures 1a–1d. 1a: monthly percentage (%) of patients with hemoglobin <11 and >13 g/dL from September 2006 to March 2008. 1b: total mortality deaths per 100 patients per protocol time and mean hemoglobin per protocol. 1c: mortality death per 100 patients and mean hemoglobin percentage for hemoglobin <11 and >13 g/dL per protocol time. 1d: hemoglobin mean percentage for hemoglobin <11 and >13 g/dL and mortality deaths per 100 patients on protocols A: pre-FDA and combined protocols B and C: post FDA (see protocol table 1)

**Table 3. Mortality characteristics study cohort by protocol time**

| Mortality Characteristic | Protocol A                    | Protocol B                    | Protocol C                    | P-value (ANOVA) |
|--------------------------|-------------------------------|-------------------------------|-------------------------------|-----------------|
| Overall total            | 127                           | 98                            | 113                           | <0.01           |
|                          | Mortality deaths/100 patients | Mortality deaths/100 patients | Mortality deaths/100 patients |                 |
| Corrected by census      | 1.77                          | 1.40                          | 1.54                          | <0.01           |
| Hgb >13 g/dL             | 0.20                          | 0.09                          | 0.11                          | <0.003          |
| Hgb 11-13 g/dL           | 0.95                          | 0.70                          | 0.71                          | 0.02            |
| Hgb < 11 g/dL            | 0.62                          | 0.61                          | 0.72                          | 0.09            |

**DISCUSSION**

Anemia treatment and hemoglobin (Hb) goal target remain a controversial topic not only in CKD but also in CAD and oncology patients. In CKD patients several recent studies reported no benefit in having patients achieve a high hemoglobin (target >13g/dl). The **CHOIR (Correction of Hemoglobin and Outcomes in Renal Insufficiency)** Study a randomized controlled trial, enrolled 1,432 CKD stages II to IV patients randomized to erythropoietin (EPO) dosages to achieve target hemoglobin levels of either 13.5 g/dL or 11.3 g/dL. This study showed more adverse events occurring in the higher hemoglobin group compared to the low hemoglobin group.<sup>9</sup> The **CREATE (Cardiovascular Risk Reduction by Early Anemia Treatment with Erythropoietin)** Study a randomized controlled trial, enrolled 1,200 CKD stages II-IV patients and assigned patients to an early or late anemia correction. There was no statistical significant difference between groups for the primary end-point while **quality of life (QoL)** was improved at 1 year in the early correction group.<sup>8,12</sup> The **TREAT** Study a randomized control trial, enrolled 4,404 CKD Stage II to IV type II diabetes mellitus patients to darbepoetin alpha with the goal to achieve hemoglobin target level of 13 g/dL or a placebo group with rescue darbepoetin therapy once hemoglobin level was <9 g/dL revealed no mortality benefit to higher hemoglobin targets, but a higher risk of stroke.<sup>10</sup>

Significant changes have occurred since the introduction of **epoetin alfa (EPO)** into clinical practice in late 1988 when the **United States Food and Drug Administration (FDA)** approved recombinant human EPO for use in anemia of renal failure to an average goal of (Hb 7-8 g/dL).<sup>13,14</sup>

In the 1990s EPO reimbursement was per EPO units administered. Initial anemia correction was viewed simply as treatment with EPO along with correction of iron deficiency to increase hemoglobin levels from below 10 g/dL. This was directly connected with the released of publications showing improvement in outcomes in EPO-treated patients with Hematocrit in low 30s vs. non-EPO-treated patients with Hct in low 20s.<sup>13-15</sup>

Amgen sponsored the **National Kidney Foundation (NKF)** to develop evidence-based practice guidelines for anemia, dialysis adequacy and vascular access (KDOQI Guidelines).<sup>6,16,17</sup> The NHS was the first EPO trial that was powered to assess mortality in hemodialysis patients. The NHS study was stopped early due to concern for higher mortality in patients randomized to the higher hematocrit (42%) group vs. low hematocrit (30%), and due to an increase in vascular access thrombosis.<sup>11</sup>

With this new anemia correction data and the potential adverse outcomes and side effects revealed, the 2001 KDOQI Anemia Guidelines was released by the National Kidney Foundation setting the target hemoglobin range to 11 to 12 g/dL, Hct 33-36%, and a more aggressive use of IV iron to spare EPO. In 2006 the FDA instituted a Black Box Warning to use the lowest dose of erythropoietin stimulating agents that will gradually increase the hemoglobin concentration to the lowest level sufficient to avoid the need for red blood cell transfusion.

In addition, since safety concern and efficacy of anemia correction with erythropoietin stimulating agents has been the subject of numerous observational studies hemoglobin levels within the target range of 11 to 12 g/dl were adopted from the National Kidney Foundation Kidney Dis-

ease Outcomes Quality Initiative clinical practice guidelines<sup>11,18-20</sup> differing from the 10 to 12 g/dL target recommended by the FDA.

Two recently published studies investigated variability in hemoglobin concentration is their correlation to mortality in patients with end-stage renal disease.<sup>21,22</sup> Hemoglobin variability was shown to be independently associated with decreased survival for each 1 g/dL increase in hemoglobin variability and was associated with a 33% increase in the risk of death. Gilbertson et al<sup>23</sup> stated that mortality was greatest in patients who had low hemoglobin levels for ≥3 months and that the number of months with hemoglobin below the target level might be a better predictor of mortality than variability itself.

Based on current guidelines, ESA dosing protocols should strive to maximize the number of patients with hemoglobin levels in the 10-12 g/dL range while minimizing the proportion of patients in the high-hemoglobin range. To achieve this level of control, it would be necessary to allow for timely changes in hemoglobin levels through more frequent hemoglobin monitoring and more frequent dose adjustments. Additional factors, such as the mode of ESA dose and holding practices may also influence hemoglobin curve distribution.

Our study shows that we are able to manipulate the overall level of hemoglobin with the institution of ESA automated protocols. The change in hemoglobin levels among protocols was apparent; indicating that the ESA automated protocols were effective for achieving desired hemoglobin targets. In addition, even though the entire distribution appears to have shifted toward lower hemoglobin ranges initially it back toward higher hemoglobin levels after institution of modified protocol C.

Our data demonstrated that the reduction in the percentage of individuals with hemoglobin >13g/dL was correlated with reduction in mortality. The increase in the percentage patients with hemoglobin <11g/dL was not associated with increase in mortality even though the distribution resulted primarily from migration of patients from higher hemoglobin toward the lower ranges. Although there were variations in the study co-variables it did not indicate that these dialysis adequacy parameters may have contributed to the observed changes. Noteworthy, there

were no changes in the iron management protocols or any other protocol other than the instituted ESA dosing protocols.

Some important limitations of our study need to be considered. Although the sample size was relatively large, we incorporated all the DSI dialysis centers data available and we excluded those that did not have a fully functional electronic system for patient-level data collection.

We consider it to be extremely unlikely for changes in patient characteristics to be an explanation for the hemoglobin variations reported in this study because patient characteristics change over a much longer period of time and anemia management practices have a far greater and immediate impact on the mode of hemoglobin level distribution in the evaluated patient population.

It is possible that there are other differences that were not measured or accounted for in this analysis that caused the mortality differences. Due to missing data we were not able to perform a multivariable model to account for confounding. However, evaluating Table 2 shows that most clinical characteristics worsened (KT/V, URR) rather than improved during this time period. In addition some of the results observed in this study may be accounted for the seasonal variation in mortality.<sup>24</sup>

Another limitation of the study is that although most of hemoglobin data was from outpatient dialysis units, data from inpatient hospitalization records were also included if mortality ensued. It is noteworthy to mention that only about <5% of dialysis sessions per patient per year occur in the inpatient setting hence, hospitalizations is very unlikely to explain the results discussed in this study.

Despite these limitations, this study offers important findings regarding changes in hemoglobin level distribution and mortality for a large hemodialysis provider. How these changes will ultimately affect patient outcomes in the longer term is unclear and is a topic of further investigation. It would be prudent to conduct clinical trial in a large hemodialysis provider for longer period of time in order to avoid seasonal variation, to withhold ESA dosage when hemoglobin reaches either 11 g/dL or 12g/dL and to have a target goal hemoglobin of 9-11g/dL or 10-12g/dL respectively in order to be able to properly evaluate adverse events and mortality.

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# Cervical Manipulation and the Myth of Stroke

Donald R. Murphy, DC, DACAN

## CERVICAL MANIPULATIVE THERAPY (CMT)

is a treatment that is commonly used by chiropractic physicians for neck pain and headache. It is well accepted in chiropractic medicine as a beneficial and safe treatment method. However CMT has had its share of controversy within the medical profession, particularly among neurologists and, to a lesser extent, neurosurgeons. This primarily relates to concerns about the safety of CMT. A number of publications have appeared in the neurology and neurosurgery literature warning of the “dangers”<sup>1</sup> of this “potentially fatal”<sup>2</sup> form of treatment. Perhaps the most controversial and sensationalistic condition that has been associated with CMT is **vertebral artery dissection (VAD)** and its related stroke. The purpose of this paper is to examine the evidence of the risk of CMT with regard to VAD as well as to discuss the significance of our current understanding of this risk for chiropractic and medical physicians.

VAD is an uncommon cause of stroke that involves a tear in the vertebral artery leading to stroke.<sup>3</sup> VAD accounts for only 0.4 – 2.5% of all strokes and tends to occur in younger individuals, with the peak incidence occurring in the 40s.<sup>3</sup> Patients who develop VAD have a structural defect in the vertebral arteries that predisposes them to develop this disorder.<sup>3</sup> Importantly, in 80% of cases the initial symptom is neck pain with or without headache.<sup>3</sup>

## How Did CMT and VAD Become Associated?

A number of case reports published over the course of several decades recounted patients who had received CMT and subsequently experienced a stroke related to VAD.<sup>4</sup> These were single cases reported in which the natural assumption was that the CMT directly caused the VAD and stroke. Two later retrospective surveys were published, one of neurologists<sup>5</sup> and the other of chiropractors,<sup>6</sup> in which practitioners had been asked to recall how many cases of VAD after CMT they had been exposed to in the previous two years<sup>5</sup> and ten years,<sup>6</sup> respectively. Again, the as-

sumption in these publications was that a direct causal relation existed between CMT and VAD with CMT as cause and VAD as effect. This was a reasonable assumption given the VAD occurred after the CMT, although in many cases the VAD did not occur until weeks after the CMT.

## CASE-CONTROL STUDIES

Four case-control studies have been published. The first<sup>7</sup> was a six-year study in which 582 patients who had experienced VAD were compared to 2,328 people with no history of stroke. The study found that VAD patients who were under age 45 were five times more likely than controls to have visited a chiropractor within 30 days of having had their stroke. There was no association between a visit to a chiropractor and VAD in patients 45 and older. The second case control study<sup>8</sup> in which 51 patients with cervical artery dissection, 25 involving the vertebral artery (i.e., VAD) and 26 involving the internal carotid artery, were compared with 100 controls who had other types of stroke. The authors found that individuals with VAD (though not individuals with internal carotid artery dissection) were six times more likely to have seen a chiropractor within 30 days of their stroke. The third case control study<sup>9</sup> examined 47 patients with either VAD or internal carotid artery dissection (they did not distinguish between these types of stroke) and 47 patients with other types of stroke. They compared the two groups with regard to exposure to a number of mechanical events including CMT, lifting, mild trauma, sexual intercourse and athletic activity. They found no association between any of the mechanical events, including CMT and cervical artery dissection.

Two of these three case control studies found an association between CMT and VAD.<sup>7, 8</sup> Two possible explanations for this association were suggested by the authors of these studies:

- CMT can cause VAD in rare cases
- Patients with VAD consult chiropractors for the initial symptoms

of VAD (neck pain with or without headache and sometime after the visit develop the remaining symptoms of VAD (symptoms of neural ischemia in the territory of the posterior circulation).

In addition, the study that found no association may have simply not had sufficient numbers of subjects to make an inference.

None of these studies was designed in a way that allowed one to distinguish between these possibilities. This led to the most recent case control study,<sup>10</sup> replicating the Rothwell, et al<sup>7</sup> study with an important addition: they included not only visits to chiropractors prior to the VAD event but also visits to **primary care practitioners (PCPs)**. The study covered 109,020,875 person-years of observation over a nine year period. The cases were 818 patients with VAD and the controls were 3,164 age- and sex-matched individuals with no history of stroke. With regard to the association between visits to chiropractors and VAD the findings of this study were similar to that of Rothwell, et al.<sup>7</sup> In individuals under 45 years of age there was an increased association between VAD and visits to chiropractors within 30 days. No such association was found in individuals age 45 and older. However an increased association was also found between VAD and visits to PCPs within 30 days. There was no statistical difference between the likelihood of VAD after having seen a PCP vs. after having seen a chiropractor. In fact, in contrast to what was found in patients who had seen chiropractors, the increased association between a visit to a PCP and the occurrence of VAD was found both in individuals under age 45 and those age 45 and older. Importantly, the association was greatest in cases in which the practitioner visit was for neck pain or headache. So in examining which of the two likely explanations for the association between CMT and VAD this study provided two possibilities:

- Both chiropractors and PCPs cause VAD on rare occasions.

- Patients with VAD consult chiropractors or PCPs for the initial symptoms of VAD and sometime after the visit develop the remaining symptoms of VAD.

It would be difficult to fathom what PCPs are doing that would cause dissection of a vertebral artery. Therefore, the second possible explanation is the likely one, i.e., in 80% of cases of VAD the initial symptom is neck pain and/or headache. Patients who develop these symptoms typically consult either their PCP or a chiropractor in seek of relief. At some point after this visit they develop the full manifestation of stroke related to VAD, incidental to anything either practitioner did. Indeed, the conclusion of the authors of the Cassidy, et al study<sup>10</sup> was “This suggests that patients with undiagnosed vertebral artery dissection are seeking clinical care for headache and neck pain before having a VBA stroke.”<sup>10</sup>

There have been published cases in which a patient without symptoms of neck pain or headache has experienced VAD after CMT (it is not uncommon for some chiropractors to theorize that treating one area of the spine affects problems in other areas). Thus it may be possible for CMT to hasten VAD in a patient who is already predisposed to this disorder. However, if this is possible it would have to be so exceedingly rare that the Cassidy et al study,<sup>10</sup> which covered over 109 million person-years over a ten-year period, failed to detect it.

The current best evidence with regard to VAD has important implications for both medical physicians and chiropractic physicians.<sup>4</sup> Medical physicians, particularly neurologists and neurosurgeons need not be concerned about CMT being a cause of stroke. Given the evidence of effectiveness of this form of treatment for neck pain and headache<sup>11</sup> the risk: benefit ratio is very favorable.

For both chiropractic physicians and PCPs, as well as others who see patients with neck pain and headache, it is important to be aware of the possibility that the patient may have VAD in development.<sup>4</sup> Many patients will not have any detectable signs or symptoms that would alert the practitioner to this possibility. However as the clinical manifestation of neural ischemic findings can develop gradually,

there may be subtle findings that can be useful for the practitioner in suspecting the presence of VAD.<sup>4</sup>

In addition, the new understanding of the relationship between CMT and VAD potentially opens the door to improved relations and cooperation between doctors of chiropractic and medical physicians. The traditional antagonism between these professions, partially represented by the controversy over the perceived risks of CMT, has been one that has made collaboration difficult. Although relations between the professions has certainly improved in recent years, and interdisciplinary collaboration has become more common, a better mutual understanding and respect can go a long way toward improving care for patients with spine related disorders.

## CONCLUSION

CMT and VAD have been linked in controversy for a number of years. This relationship has been a source of consternation between chiropractors and medical physicians, particularly neurologists. Current best evidence has found no convincing support for a causal relation between CMT and VAD and that patients with VAD seek the care of chiropractors or PCPs for the initial symptoms of the disorder, developing stroke after this unrelated to the manipulation. This is still a contentious notion however.<sup>12</sup> Better understanding of a lack of causal relation between CMT and VAD should open the door to improved relations between chiropractic medicine and allopathic medicine which has the potential to translate into improved coordination of care for patients with spine related disorders.

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# Medical Marijuana In Huntington's Disease: Report of Two Cases

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## HUNTINGTON'S DISEASE (HD) IS

AN autosomal dominant inherited disorder characterized by chorea or other movement abnormalities, dementia, and a wide spectrum of psychiatric disorders. The treatment of HD is symptomatic and limited.<sup>1</sup> Some HD patients in the Movement Disorders clinic at Butler Hospital revealed that they were using marijuana on a regular basis. We hypothesized that marijuana provided psychological or physical relief of the patient's HD symptoms. Prior studies have used isolated compounds from marijuana and focused on motor symptoms.<sup>2,3</sup> The results of this study will hopefully direct further research into how marijuana might benefit patients with HD or other neurodegenerative disorders perhaps adding another therapeutic option to a devastating disease.

Patients with HD taking **medical marijuana (MM)** were invited to participate in the study, which was approved by the Butler Hospital IRB. The patients provided written informed consent. The patient was evaluated while taking MM as usual and then was asked to refrain from using marijuana for 48 hours. Subjects were tested when taking the MM and when off the drug. We performed the State-Trait Anxiety Inventory, Montgomery-Åsberg Depression Rating Scale, and Montreal Cognitive Assessment. The Unified Huntington's Disease Rating Scale was used to assess motor function. The subjects' scores on these tests were compared to themselves on and off the drug.

Our study showed that subjects had less anxiety on marijuana (improved five and nine points respectively). Subject two had less depression (ten point improvement) whereas subject one had slightly worse depression, deemed not clinically significant. Subject one had minor improvement in his motor exam (five points) and subject two had insignificant worsen-

Chart 1. Results of medical marijuana on mood, cognitive, and motor symptoms in subjects with Huntington Disease

|       | Subject 1<br>60 year old man<br>College education<br>One year since HD diagnosis |     |        | Subject 2<br>52 year old man<br>High school education<br>Three years since HD diagnosis |     |        |
|-------|--|-----|--------|---|-----|--------|
|       | On   | Off | Change | On  | Off | Change |
| STAI  | 57   | 62  | -5     | 49  | 58  | -9     |
| MOCA  | 27   | 27  | 0      | 25  | 26  | -1     |
| MADRS | 34   | 28  | +6     | 20  | 30  | -10    |
| UHDRS | 24   | 29  | -5     | 19  | 18  | +1     |

STAI (State-Trait Anxiety Inventory), MOCA (Montreal Cognitive Assessment), MADRS (Montgomery-Åsberg Depression Rating Scale), UHDRS (Unified Huntington's Disease Rating Scale).

ing (one point). There was no change in cognitive performance (Table 1) for either subject. There were no adverse events while on or off marijuana.

Pathologic studies of HD show selective loss of CB1 (cannabinoid receptor).<sup>4</sup> CB1 is found in the basal ganglia, cerebellum, dorsal primary afferent spinal-cord region and hippocampus. Marijuana is from the cannabis plant and it may contain over 60 cannabinoid compounds. The role of each of these compounds in the behavioral response to the drug is unknown. However, THC (tetrahydrocannabinol) is the main psychoactive compound, while cannabidiol and cannabinol are the main non-psychoactive components. In a rat model it was found that stimulation of CB1 slows experimental HD.<sup>4</sup> In humans, two studies evaluated the ability of cannabidiol to reduce chorea in HD. One study showed mild improvement using the tongue protrusion test and chorea severity evaluation scale.<sup>2</sup> The second study evaluated 15 patients in a placebo-controlled, double-blind, randomized, cross-over design and found no significant effect on chorea severity.<sup>3</sup> Neither study found adverse reactions to the medication. In our study both subjects reported that marijuana helped them with anxiety and depression, allowing them to sleep as well as to gain motivation.

Overall our study supports the hypothesis that marijuana improved anxiety in these two subjects; however this conclusion is limited because of a small sample size, open label testing and the possibility of a withdrawal effect in patients who had been taking the drug on a chronic basis.

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# Cardiovascular Health of HIV-infected African-American Women at the Miriam Hospital Immunology Center in Providence, RI

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## INTRODUCTION

Cardiovascular Disease (CVD), which includes coronary heart disease (CHD) and stroke, is the leading cause of death for women in the United States. CVD is a particularly important problem among minority women because of increased prevalence, morbidity and mortality. The prevalence of CVD in African American females is 44.7 percent, compared to 32.4 percent in Caucasian females.<sup>1</sup> The morbidity and mortality due to CVD is substantially higher in African American women than in Caucasian women.<sup>2</sup> CVD is also a growing concern among human immunodeficiency virus (HIV) infected individuals.<sup>3</sup> CVD in HIV-infected patients has been associated with traditional CVD risk factors, such as hypertension, diabetes, smoking and dyslipidemia.<sup>3</sup> Age, genetics and family history are important non-modifiable cardiovascular risk factors. In addition, both HIV and antiretroviral therapy have direct and indirect effects on CVD risk.

Of the 1,220 new HIV cases diagnosed and reported to the Rhode Island Department of Health from January 1, 2000 – December 31, 2008; males accounted for 874 (72%) of the cases and females accounted for 346 (28%).<sup>4</sup> Although, African American women comprise 5% of the Rhode Island population, they account for the majority of HIV cases among women (39%), followed by Hispanic (29%) and Caucasian (27%).<sup>4</sup>

We performed this study to determine the cardiovascular health among HIV-infected African American women and to

examine how well our HIV care providers screen and manage cardiovascular risk factors. In addition to reviewing screening and management practices, we wanted to determine if American Diabetes Association (ADA), American Heart Association (AHA), and National Cholesterol Education Program (NCEP) goals (for lipid level, hemoglobin A1c, blood pressure and smoking) were being met for HIV-infected African American women.

## METHODS

This was a cross sectional study conducted at the Miriam Immunology Center in Providence, the largest care provider for HIV-infected individuals in Rhode Island. The Institutional Review Board of the Miriam Hospital approved the study. The Miriam Immunology Center provided care to approximately 1,200 HIV-infected individuals in Rhode Island in 2008. African American women were defined as any non-Hispanic woman of African descent.

African American HIV-infected women to be included in this study were identified from the clinic electronic database and were included if they meet the following criteria: active patient at the clinic, defined as having seen an HIV care provider at least once during the 2008 calendar year, and at least 20 years of age, as this is the age that cardiovascular risk assessments should begin. Data were retrieved through electronic and written records.

In order to determine the overall cardiovascular health of HIV-infected African American women in the Miriam

Immunology Center, we calculated a ten year risk for CVD, CHD, stroke, and myocardial infarction (MI) using Framingham risk score (FRS) for each patient. The Framingham score can be used as a surrogate marker of cardiovascular health and was developed as an instrument or as a risk assessment tool for determining risk of future cardiovascular disease and cardiovascular events, myocardial infarction and coronary death. Although, the Framingham risk score has been noted to have several limitations in its applicability to women, African Americans, and HIV-infected individuals; D:A:D study investigators found that use of the Framingham risk score in HIV infected individuals may provide a reasonable approximation and is the best starting point available.<sup>5</sup>

For each modifiable cardiovascular risk factor we used established guidelines from the ADA/AHA/NCEP to assess appropriate rates of screening. For example, family history of cardiovascular disease should be regularly updated. Smoking status, diet, alcohol intake, and physical activity should be assessed at every routine evaluation. Patients who smoked >1 cigarette a day, were classified as smokers. As published by Aberg et al. in the 2009 Primary Care Guidelines for the management of HIV-infected persons; blood pressure, body mass index, and pulse should be recorded at each visit.<sup>6</sup> Additionally, fasting serum lipoprotein profile (or total and HDL cholesterol if fasting is unavailable) and fasting blood glucose should be measured according to patient's risk for

hyperlipidemia and diabetes, respectively (at least every five years; if risk factors are present, then annually). Furthermore, most HIV experts agree that fasting lipids and glucose should be checked at the start of antiretroviral therapy and after any treatment change.<sup>6</sup>

In order to assess whether CVD goals were achieved in this population, we used AHA guide to primary prevention of cardiovascular disease, ADA, and NCEP guidelines to define goals.<sup>7</sup> AHA goal for smoking is complete cessation; no exposure to environmental tobacco smoke. Presence of kidney disease was not documented in this study, thus goal blood pressure was defined as < 140/90 for those without diabetes and < 130/80 for those with diabetes. **Low density lipoprotein**

(LDL) goal < 160 mg/dL if zero to one risk factor, or LDL < 130 mg/dL if more than two risk factors or if HDL < 35. Physical activity goal is to exercise regularly- three to four times a week for at least 30 minutes. Patients are also expected to maintain desirable weight with a **Body mass index (BMI)** of 21-25 kg/m<sup>2</sup>. From the AHA guidelines on secondary prevention there is a goal of aspirin therapy 75mg to 162 mg/day among individuals with history of coronary disease or other vascular disease.<sup>8</sup> Diabetic patients are to have their HbA<sub>1c</sub> < 7%, according to the 2008 ADA Guidelines.<sup>9</sup>

Partial data were collected from the Immunology Center's electronic database. However, data items that were not available from the electronic database were

extracted from the clinic charts. Using information available in the charts we were able to calculate the ten year risk for CVD, CHD, MI and stroke using the Framingham risk calculator developed by Payne at the University of Edinburgh.<sup>10</sup> We also calculated rates of screening for modifiable cardiovascular risk factors, such as smoking, hypertension, dyslipidemia, weight, and diabetes captured in clinic charts and in the Immunology Center database. Lastly, we calculated rates of achieving ADA/AHA/NCEP goals among HIV-infected individuals. We used MS Access and MS Excel to manage the data collection process and SAS v.9.2 for statistical analysis. Categorical variables were compared using Fisher's exact test, and continuous variables were compared using Student's *t* test.

## RESULTS

A total of 167 African American HIV-infected women were included in the study. Patient demographic and clinical characteristics are shown in Table 1. The average age of this cohort is 42 years. Patients had a mean CD4 count of 483. Patients who smoked or had a history of diabetes or hypertension were found to have lower mean CD4 counts compared to their counterparts. Also patients who received an intervention have higher CD4 counts, although not statistically significant. 131 (78%) of the 167 of women were receiving **highly active antiretroviral therapy (HAART)**. 95 (75%) of women receiving HAART had an undetectable viral load. Current use of HAART was associated with better blood pressure control, *p* = .05; however, use of HAART was more frequently associated with less desirable outcomes such as hypertriglyceridemia, *p* = .01, obesity, *p* < .05 and higher HbA<sub>1c</sub>, *p* < .05.

Table 2 shows the Framingham risk scores for MI, CHD, CVD, and stroke. The average risk score for CVD among HIV-infected African American women was 7.6. Ten of the 12 (83%) patients with a personal history of CVD were taking ASA therapy.

### BMI

Heights were available for 98 (59%) of the 167 women, thus we were unable to calculate BMI for 69 women. The average BMI was 28, as shown in Table 3. 62 (62%) of those 98 women were classified as overweight, obese or morbidly obese. Only 29 (30%) of 98 women actually achieved goal BMI of 21-25.

### Smoking

122 (73%) of 167 women had documentation that they were screened for tobacco use during 2008. Out of the 122, 51 (42%) women were current smokers and 10 reported smoking in past. No one quit smoking, despite almost 75% of the women smokers being offered counseling, medications, or referral to support groups.

### Hypertension

67 (42%) women had a history of high blood pressure, as shown in Table 3. The overall mean systolic blood pressure (SBP) was 125 (standard deviation = 15) and the mean **diastolic blood pressure (DBP)** was 80 (standard deviation = 10).

**Table 1. Characteristics of the 167 HIV-infected African American women**

| Characteristic                         |             |
|--|-------------|
| Mean Age, (SD)                         | 42 (10)     |
| <b>HIV related</b>                     |             |
| Mean CD4 cell count cell/uL, (SD)      | 483 (257)   |
| HIV RNA load <75 copies, mL, (%)       | 95 (75)     |
| Receipt of HAART, (%)                  | 131 (78)    |
| Current use of protease inhibitor, (%) | 75 (57)     |
| Mean years on current regimen, (SD)    | 1.72 (1.48) |
| <b>Mean CD4 Counts by Risk Factor</b>  |             |
| Smoker                                 | 477         |
| Non-smoker                             | 521         |
| Diabetic                               | 464         |
| Non-diabetic                           | 522         |
| Hypertensive                           | 479         |
| Non-hypertensive                       | 523         |

SD=Standard Deviation; HAART= highly active antiretroviral therapy

**Table 2. Framingham Risk Scores a.**

| Cardiovascular Event         | Mean Score |
|------------------------------|------------|
| Cardiovascular Disease, (SD) | 7.6 (8)    |
| Coronary Heart Disease, (SD) | 5.5 (6)    |
| Myocardial Infarction, (SD)  | 2.9 (3.9)  |
| Stroke, (SD)                 | 1 (1.4)    |

SD=Standard Deviation

a. The Framingham Risk Score calculates 10 year risk for a cardiovascular event. Age, total cholesterol, **high-density lipoprotein (HDL)**, and systolic blood pressure are used to calculate the score.

Blood pressure and pulse were recorded at each visit. Of the 67 women with hypertension, 50 (75%) individuals had controlled blood pressure.

### Diabetes

54 (33%) women in our cohort had a diagnosis of diabetes, (Table 3). Fasting glucose was recorded on 126 (75%) of 167 women. HbA<sub>1c</sub> was checked on 47 (87%) women with diabetes. Of the 47 women with HbA<sub>1c</sub> recorded, 13 (28%) had HbA<sub>1c</sub> less than 7.0%.

### Dyslipidemia

Lipid levels were checked and a full lipid profile was available on 117 (73%) of the patients. 47 of the 117 (40%) had a history of dyslipidemia (Table 3). Of the 47 patients with dyslipidemia, 34 (72%) achieved their goal LDL, based on their cardiovascular risk profile.

In summary, overall rates of screening for smoking, diabetes, hypertension and dyslipidemia were 70 percent or greater and 59% for BMI. Counseling plus an oral medication were the most common interventions for hypertension, diabetes, and dyslipidemia. Women who received an intervention were more likely to achieve cardiovascular risk reduction goals; however, this trend was not statistically significant. Women who achieved cardiovascular goals had higher mean CD4 counts.

### DISCUSSION

The 10 year cardiovascular disease risk in our study was 7.6, which is comparable to scores for African American women without HIV infection. In the literature, the Framingham risk score of African American women ranges from 3.3-8.4.<sup>11,12</sup>

Our results for screening and achieving goal rates for diabetes and hyperlipidemia were similar to published findings in the general population; there have been no specific rates reported for HIV infected African American women. Rates for achieving goals of HbA<sub>1c</sub> < 7% in US general medicine clinics are between 30%-44%,<sup>13,14</sup> our rate was 28%. Current recommendations are to monitor glycosylated hemoglobin (HbA<sub>1c</sub>) and treat diabetes in HIV-infected individuals the same as in the general population.<sup>15</sup> The majority of

studies show that most HIV-infected patients treated for dyslipidemia do not achieve NCEP goals;<sup>15-17</sup> at The Miriam Hospital's Immunology Center, 72% of women achieved NCEP goal lipid levels. Lastly, women who achieved their cardiovascular goals had higher mean CD4 counts than those who did not achieve their goals.

Our study was notable for unusually high rates of smoking. Forty two percent of our cohort smoked tobacco, which is nearly three times the national average of tobacco use among African American women.<sup>18</sup> Despite high rates of counseling, the smoking cessation rate was zero. An investigation into smoking cessation was beyond the scope of this study. However, published studies have shown that smoking cessation efforts can be challenging in the HIV-infected population. One study by Lloyd-Richardson et al. showed that despite motivationally enhanced treatment plus nicotine replacement, rates of smoking cessation remained low among HIV-infected smokers.<sup>19</sup> The authors concluded that standard care treatment of support, education, and nicotine replacement should be encouraged. In the **Women's Interagency HIV Study (WIHS)**, Hispanics and non-Hispanic Caucasians were more likely to quit smoking than non-Hispanic African Americans.<sup>20</sup> At the very least these data highlight the need for future studies to examine how best to address smoking cessation among racial minorities infected with HIV.

An equally important issue among this group is obesity; over 63% of women could be classified as overweight or obese in our study. Obesity is a major problem for many Americans. The fact that there is very little documentation in the clinic charts of this

**Table 3. Cardiovascular Risk Factors among HIV-infected African American women**

|  |              |
|--|--------------|
| <b>BMI<sup>a</sup></b>   | <b>N=98</b>  |
| Under Weight (BMI < 21), (%)                                     | 7 (7)        |
| Desired (BMI 21-25), (%)   | 29 (30)      |
| Overweight (BMI 25-29), (%)                                      | 23 (23)      |
| Obese (BMI 30-35), (%)   | 30 (31)      |
| Morbid obese (BMI >35), (%)                                      | 9 (9)        |
| <b>Smoking Status</b>  | <b>N=122</b> |
| Current, (%)   | 51 (42)      |
| Past, (%)  | 10 (8)       |
| Never, (%)   | 61 (50)      |
| <b>History of High Blood Pressure</b>                            | <b>N=67</b>  |
| Mean SBP mm Hg, (SD)   | 125 (15)     |
| Mean DBP mm Hg, (SD)   | 80 (10)      |
| <b>History of Diabetes</b>                                       | <b>N=54</b>  |
| HbA <sub>1c</sub> less than 7.0%, (%)                            | 13 (28)      |
| <b>Personal history of CVD</b>                                   | <b>N=12</b>  |
| Aspirin therapy for those with known cardiovascular disease, (%) | 10 (83)      |
| <b>History of Dyslipidemia</b>                                   | <b>N=47</b>  |
| Mean TC mg/dL, (SD)  | 175 (41)     |
| Mean HDL mg/dL, (SD)   | 48 (18)      |
| Mean LDL mg/dL, (SD)   | 102 (35)     |
| Mean TG mg/dL, (SD)  | 123 (71)     |

SD=Standard Deviation; BMI=body mass index; HDL= high-density lipoprotein; LDL=low-density lipoprotein.

a.BMI was calculated as (weight in pounds \* 703) divided by the square of height in inches.

problem may speak to the fact that HIV care providers have traditionally managed wasting disease in their HIV infected population. It is important to manage weight aggressively in this population because of the deleterious effects of obesity.

It is important to recognize the limitations of the present study. First, we had missing data for BMI and for lipid studies and this may have been because we selected patients who had at least 1 clinic visit in the past 12 months. Ideally patients should have more than one visit in a year and if a patient only comes to one visit they may not have received all necessary blood work on that one visit. Second, we were able to calculate rates of different interventions, such as medication, counseling, and referrals, but we may have underestimated the number of specialty referrals because they could have been made prior to January 2008, the

start of this study. Third, this study was done only in African American women in Providence so data cannot be extrapolated to other groups of women, or women living in other regions of the US where the barriers and obstacles of care may be different.

In conclusion, people at risk for CVD are encouraged to maintain a healthy weight, eat a healthy diet that is low in fat and cholesterol, and increase their physical activity. Modification of traditional CVD risk factors and careful selection of ART may aid in preventing CVD among patients with HIV. Research in the future should specifically explore modalities to decrease CVD risk among African American HIV-infected women by introducing more regular and tailored interventions, such as targeted smoking cessation, special nutrition counseling and weight management programs.

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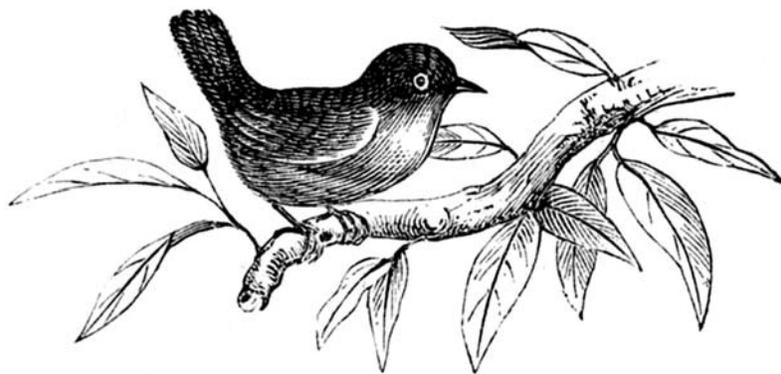
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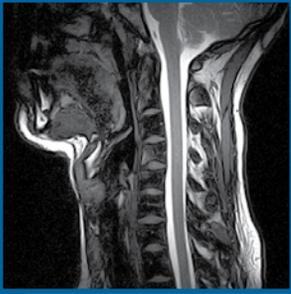


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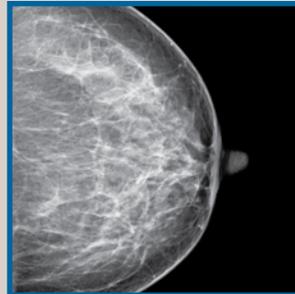


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# First Steps, a Resident-Run Postpartum Support Group For a High Risk Community

Mary Beth Sutter, MD, Jordan White, MD, MPH Nirali Bora, MD, Sarah Morchen, MD, and Susanna Magee, MD, MPH

**DISPARITIES IN MATERNAL AND CHILD HEALTH** are a local and national problem. Young minority women with limited education and low socioeconomic status have lower rates of breastfeeding and higher rates of postpartum depression.<sup>1,2</sup> Their children are at risk for developmental and behavioral disorders, low academic performance, and adolescent pregnancy.<sup>3,4</sup> It is essential for women at high risk to receive support from their physicians and communities.

Postpartum support interventions provide the most benefit to low-income women with a high risk of family dysfunction and postpartum depression.<sup>5</sup> Postpartum support groups are one of the most widely used, yet understudied, methods of intervention. Support groups for adolescents in urban communities have been shown to decrease rates of repeat pregnancy, primarily through encouragement of the use of long-acting contraception in the participants and through the social support of nurses or social workers.<sup>6-8</sup> Educational groups have also been shown to be effective for high-risk populations.<sup>9</sup> Groups that focus on educating parents through discussion of nutrition, discipline, and child development have been shown to improve mother-child relationships, behavioral outcomes for children, and confidence in parenting.<sup>10-12</sup> We are not aware of any studies which describe involvement of physicians in training for postpartum interventions.

In this paper we discuss the implementation of a resident-run program created to serve women in high risk communities such as Central Falls and Pawtucket.

## METHODS

First Steps is a postpartum support group facilitated by family medicine residents at Memorial Hospital of Rhode Island in Pawtucket. Women were recruited to the group by their resident primary care physicians and through flyers distributed in the community. Monthly two-hour sessions were held with mothers

and their children and included informal discussions facilitated by family medicine residents and medical students. Meetings were held in English but included Spanish interpretation. Discussion topics were chosen by the mothers and included postpartum depression, nutrition, infant massage, maternal fitness, discipline, safety, development, contraception, and community resources. Healthy snacks were provided and childcare items or books were given to the mothers at each meeting. This project was approved by the Institutional Review Board of the community hospital.

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**Residents and medical students involved with the group reported increased confidence in anticipatory guidance counseling and patient education and greater knowledge of childhood development.**

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To evaluate the group, a demographic background survey was given to each woman at the first meeting attended. At the end of the year, women completed an 18-item questionnaire and participated in a focus group which assessed support, parenting knowledge, and satisfaction with the group. Answers to the questionnaire were anonymous but could be shared by the mother completing it with the focus group as she desired.

## RESULTS

Eighteen meetings were held between October 2007 and April 2009. An average of four mothers (range zero to seven),

originally from the United States, Puerto Rico, and Guatemala, and ranging in age from 19 to 30 years, attended each meeting, with 12 total women attending at least one meeting. Most mothers' income level was determined to be near the federal poverty level and several had not completed high school. All mothers attended with one to three children aged two months to four years.

Three regular participants in the group completed a focus group as described above. Overall, the mothers felt that First Steps provided a safe, open, non-judgmental environment and fostered a sense of support not found elsewhere. One mother wrote that the group "makes me feel like I'm not alone." Members of the group were not only able to learn from physicians, but from one another as well. Mothers reported improved knowledge about community resources, infant feeding, and safety. When asked about what expectations she had had of the group before coming, one mother replied, "I had very high hopes... I expected support, advice and friends, and I got all of them." All of the mothers desired more frequent meetings and more participants. Challenges included work or school scheduling and transportation. Residents and medical students involved with the group reported increased confidence in anticipatory guidance counseling and patient education and greater knowledge of childhood development.

## DISCUSSION

Our exploratory study suggests that resident-run postpartum support groups enhance maternal well-being among mothers in low-income communities and provide a valuable medical education experience. The overriding themes of the focus group show that women gained a sense of support, knowledge, and improved confidence in parenting as a result of participation.

First Steps was designed to provide an open, supportive environment for mothers of various ages with one or more children. This proved to be a strength of

the group as women with more experience could share their wisdom with new mothers and the resident facilitators. Encouraging mothers to bring their children also provided an opportunity for mothers and doctors to discuss child health and development outside of regularly scheduled well child checks.

Another strength of First Steps was the involvement of both residents and medical students, which provided opportunities to facilitate discussions, learn from more senior physicians and patients, and provide patient care in a unique fashion.

Challenges of First Steps included difficulty in recruiting new participants and sustaining membership. The timing of the meetings, which was based on the availability of physicians, made it difficult for some mothers to attend. In the future, involvement of a community organization could increase participation and reduce the burden on physicians.

In addition to a small number of participants, this study has several limitations. Due to difficulties in recruitment and inconsistent participation, a pre- and post-intervention comparison was not possible. In addition, survey questions used qualitative measures rather than validated scales. Future studies will implement more rigorous support evaluation tools to help determine the efficacy of the group for improving patient well being and medical education.

Despite these challenges, First Steps is a unique opportunity to enhance the well-being and parenting abilities of mothers in a disadvantaged community. The group also strengthens the patient-doctor relationship and gives residents a chance to learn from patients. We hope to continue to evolve to meet the needs of mothers and provide a space that, in the words of one mother, "makes me feel like I'm not the only one going through the hard times with growing children." The mothers of First Steps continue to meet on a regular basis with future goals including recruitment of new members as well as the design of evaluation methods to better assess outcomes of this enriching experience.

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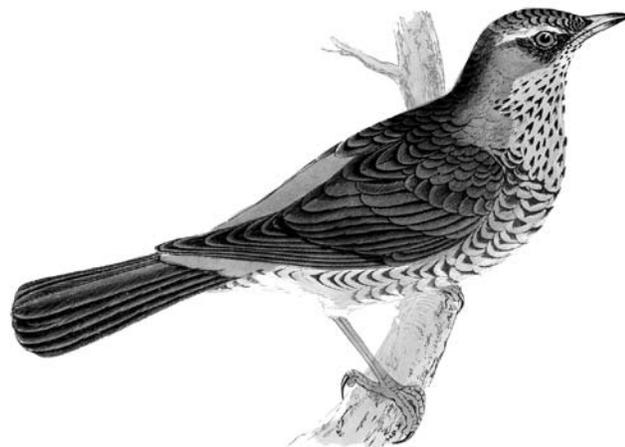
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# Using a Professional Organization, MomDocFamily, to Understand the Lives of Physician-Mothers

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**IN THE US, THE PERCENTAGE OF FEMALE** medical school graduates increased from 27% in 1983 to 48% in 2010.<sup>1</sup> As the number of women in medicine continues to rise, questions about the effects of family on professional life—and vice versa—are emerging for individual physician-mothers as well as for their colleagues, employers, and institutions.

To our knowledge, there are no published assessments of programs explicitly addressing the needs of physician-mothers. One model targeting this segment of the medical workforce is MomDocFamily (MDF).<sup>2</sup> Originally established in 2003 by two physician-mothers in Rhode Island, MDF is a large, primarily regional organization that links physician-mothers from all specialties and stages of medical career. Communication among members occurs mostly on-line via a confidential

listserv. Additionally, members self-select to collaborate on group initiatives such as the establishment of lactation facilities and parental leave policies.<sup>3,4</sup>

The objectives of this study were to: 1) evaluate the demographic composition of MDF's membership and members' utilization of the organization; and 2) assess quantitatively and qualitatively the experiences of MDF members as physician-mothers.

## METHODS

This study was conducted in two phases between July 2009 and July 2010 and approved by the Institutional Review Boards of The Warren Alpert Medical School of Brown University, the Lifespan health care system, and Women and Infants Hospital of Rhode Island.

## SURVEYS

A survey that included 39 questions about demographics, family structure, participation in MDF, and interest in participating in a focus group was developed by the primary investigator, piloted by two other investigators, and then revised. In June of 2009 there were 158 names and email addresses available through MDF's listserv. Thirty-six individuals were eliminated due to lack of correct contact information, having recently left the organization, or having moved out of the Rhode Island/Southern Massachusetts region.\* The survey was emailed to the remaining 122 members. Between July and September 2009, each participant who had not yet responded received a maximum of four emails followed by two phone calls.

\* MDF began including members from outside this region after the start of this study. Currently, the organization has 279 members representing 31 specialties.

**Table 1. Demographics of MomDocFamily members as of June 30, 2009 (n=84).**

|                                 |  | % (No.)          |  |           | % (No.)   |
|---------------------------------|--|------------------|--|-----------|-----------|
| Level of training/career        |  | (84)             | Spouse/partner's work status <sup>‡</sup>          |           | (75)      |
|                                 | Attending                                | 76.2 (64)        | Full-time  |           | 90.7 (68) |
|                                 | Fellow                                   | 11.9 (10)        | Part-time  |           | 6.7 (5)   |
|                                 | Resident                                 | 8.3 (7)          | Unemployed   |           | 2.7 (2)   |
|                                 | Medical student                          | 3.6 (3)          | No. of children <sup>‡</sup>                       |           | (83)      |
| Specialty*                      |  | (81)             | 1  |           | 42.2 (35) |
|                                 | Primary care                             | 34.6 (28)        | 2  |           | 43.4 (36) |
|                                 | Medicine and pediatric subspecialties    | 19.8 (16)        | 3  |           | 12.1 (10) |
|                                 | Psychiatry + psychiatric subspecialties  | 11.1 (9)         | 4+   |           | 2.4 (2)   |
|                                 | Emerg. medicine (EM) + EM subspecialties | 4.9 (4)          | Ages of children <sup>‡</sup>                      |           | (83)      |
|                                 | Surgery + surgical subspecialties        | 4.9 (4)          | 0-12 mo  |           | 14.0 (20) |
|                                 | Ob/Gyn                                   | 12.4 (10)        | 13 mo - 4 yrs                                      |           | 48.3 (69) |
|                                 | Other non-surgical specialties           | 12.4 (10)        | 5-9 yrs  |           | 28.7 (41) |
| Marital status <sup>‡</sup>     |  | (83)             | 10-12 yrs  |           | 6.3 (9)   |
|                                 | Married                                  | 95.2 (79)        | 13-18 yrs  |           | 2.8 (4)   |
|                                 | Single                                   | 0.0 (0)          | Career level at 1 <sup>st</sup> birth <sup>‡</sup> |           | (82)      |
|                                 | Partnered                                | 3.6 (3)          | Pre-med/medical student                            |           | 8.5 (7)   |
|                                 | Divorced                                 | 1.2 (1)          | Resident   |           | 35.4 (29) |
| Among Attending Physicians Only | No. of yrs attending phys. <sup>‡</sup>  | (62)             | Fellow   |           | 22.0 (18) |
|                                 | ≤1                                       | 9.7 (6)          | Attending  |           | 34.2 (28) |
|                                 | 2-3                                      | 25.8 (16)        | Work status <sup>‡</sup>                           |           | (83)      |
|                                 | 4-6                                      | 27.4 (17)        | Full-time  |           | 78.3 (65) |
|                                 | 7-9                                      | 21.0 (13)        | Part-time  |           | 21.7 (18) |
|                                 | ≥10                                      | 16.1 (10)        | Total hrs working per week <sup>‡</sup>            |           | (77)      |
|                                 | Job description <sup>§</sup>             | (64)             | <40  |           | 19.5 (15) |
|                                 | Clinician                                | 53.1 (34)        | 40   |           | 7.8 (6)   |
|                                 | Clinician-educator                       | 54.7 (35)        | 41-59  |           | 40.3 (31) |
|                                 | Researcher                               | 17.1 (11)        | >60  |           | 32.5 (25) |
|                                 | Academic rank                            | (44)             | Providing childcare <sup>‡</sup> :                 |           | (82)      |
|                                 | Full Professor                           | 0.0 (0)          | In the evening / after work:                       |           |           |
| Associate Professor             | 9.1 (4)                                  | Physician-mother |  | 93.9 (77) |           |
| Assistant Professor             | 72.7 (32)                                | Partner/spouse   |  | 72.0 (59) |           |
| Clinical Instructor             | 18.2 (8)                                 |                  |  | 6.0       |           |
|                                 |  |                  |  | 2.2-16.7  |           |

\* This number does not include medical students. Primary care includes pediatrics, internal medicine, medicine/pediatrics, family medicine, and geriatrics; medicine and pediatric subspecialties include gastroenterology, hem./onc., inf. disease (both adult and pediatric), ped. endocrinology, genetics, sleep medicine, neonatology; psychiatric subspecialties include child and adol. psychiatry and those who are triple boarded (peds/psych/child psych); EM subspecialties include sports medicine and ped. emergency medicine; surgical subspecialties include orthopedic surgery; ob/gyn includes general ob/gyn and reproductive endocrinology; non-surgical subspecialties include radiology, neurology, neuroradiology, dermatology, and pathology.

<sup>‡</sup>This person works for a private company.  
<sup>‡</sup> These questions were not answered by all respondents.  
<sup>§</sup> These add up to more than 100% since many respondents checked more than one response.

**Table 2. Focus group demographics (n=11).**

|  | %    | (No.) |                                       | %    | (No.) |
|--|------|-------|---------------------------------------|------|-------|
| Level of training/career                     |      | (11)  | No. of children                       |      | (11)  |
| <i>Attending</i>                             | 90.9 | (10)  | 1                                     | 18.2 | (2)   |
| <i>Fellow</i>                                | 9.1  | (1)   | 2                                     | 63.6 | (7)   |
| <i>Resident</i>                              | 0.0  | (0)   | 3                                     | 18.2 | (2)   |
| <i>Medical student</i>                       | 0.0  | (0)   | 4+                                    | 0.0  | (0)   |
| Specialty*                                   |      | (11)  | Ages of children                      |      | (11)  |
| <i>Primary care</i>                          | 54.5 | (6)   | 0-12 mo                               | 13.6 | (3)   |
| <i>Medicine and pediatric subspecialties</i> | 27.3 | (3)   | 13 mo – 4 yrs                         | 50.0 | (11)  |
| <i>Surgery + surgical subspecialties</i>     | 9.1  | (1)   | 5-9 yrs                               | 27.3 | (6)   |
| <i>Ob/Gyn</i>                                | 9.1  | (1)   | 10-12 yrs                             | 9.1  | (2)   |
| Work status                                  |      | (11)  | 13-18 yrs                             | 0.0  | (0)   |
| <i>Full-time</i>                             | 63.6 | (7)   | Career level at 1 <sup>st</sup> birth |      | (11)  |
| <i>Part-time</i>                             | 36.4 | (4)   | <i>Pre-med/medical student</i>        | 0.0  | (0)   |
| Marital status                               |      | (11)  | <i>Resident</i>                       | 63.6 | (7)   |
| <i>Married</i>                               | 100  | (11)  | <i>Fellow</i>                         | 18.2 | (2)   |
| <i>Single</i>                                | 0.0  | (0)   | <i>Attending</i>                      | 18.2 | (2)   |
| <i>Partnered</i>                             | 0.0  | (0)   |                                       |      |       |
| <i>Divorced</i>                              | 0.0  | (0)   |                                       |      |       |

\*Primary care includes pediatrics, internal medicine, medicine/pediatrics, family medicine, and geriatrics; medicine and pediatric subspecialties include gastroenterology, hem./onc., inf. disease (both adult and pediatric), ped. endocrinology, genetics, sleep medicine, neonatology; surgical subspecialties include orthopedic surgery.

### FOCUS GROUPS

Three focus groups, each with three to five physician-mother participants, were conducted between December 2009 and July 2010 at The Warren Alpert Medical School of Brown University (two) and at Rhode Island Hospital (one). These groups were led using a semi-structured interview guide developed from themes that emerged in qualitative responses to questions in the emailed survey about challenges faced by physician-mothers and MDF's role in supporting its members.

Each 60- to 90-minute focus group was facilitated by the principal investigator, attended by an investigator-observer, and digitally recorded. Written consent was obtained from each participant. Childcare was provided as needed. Focus groups were continued until the themes elicited independently in the discussions became saturated and no new information was shared. The digital recordings were transcribed without identifiable information and then coded.

Investigators and two additional members of the MDF Advisory Board reviewed transcripts of the discussions and agreed on emerging themes until consensus was reached on interpretations and searches for alternative interpretations had been undertaken.

### STATISTICAL ANALYSIS

Quantitative information was analyzed using SAS version 9.2. Chi-squared tests of associations were used to compare responders and non-responders. Either chi-squared tests or one-way analyses of

variance were performed to examine associations between specific personal and professional characteristics of physician-mothers. P-values were considered to be significant with  $\alpha < 0.05$ . Logistic regression models were used to assess differences in the probability of events occurring such as the provision of childcare by physician-mothers versus their partners/spouses.

### RESULTS

Of the 122 eligible MDF members, 84 responded to the survey (response rate 68.9%), 42 by email and 42 by phone. Compared to responders, non-responders were not significantly different with respect to specialty and career level.

#### Professional and personal characteristics of MDF members

Seventy-six percent of MDF members reported their career level as attending physician. (Table 1) Members represented 28 different specialties, with over one-third working in primary care. Of the attending physicians, 69% reported working in academic medicine. Although 37% of these professionals had been out of training for seven or more years, none reported academic rank to be full professor.

One respondent was divorced while the rest were married or partnered. Eighty-five percent had one or two children, and 91% of children under the age of nine. Two-thirds of respondents reported having their first child during training, 35% during residency. After controlling for specialty, total hours working per week was inversely

associated with the number of children per physician-mother ( $p = 0.0013$ ).

### Work-life balance

Eighty-one percent of respondents stated that they work at least 40 hours per week, including 29% of those who reported working part-time. Total hours worked per week was significantly associated with specialty ( $p = 0.01$ ), as was full-time employment status ( $p = 0.005$ ). Those in non-primary care specialties were more likely to work more hours per week and to be of full-time status.

The majority of households (92%) contained dual working parents, and 21% of respondents reported that their partners and spouses travel frequently (data not shown). Mothers were six times more likely take care of their children after work hours compared to their partners/spouses (odds ratio [OR]: 6.0; 95% confidence interval [CI]: 2.2-16.7).

### Challenges facing physician-mothers

A total of eleven MDF members participated in focus groups. (Table 2) Discussions within these groups revealed three common challenges faced by physician-mothers: the impact of lengthy training on fertility decision-making; responsibility for the wellbeing of other people in both their professional and personal roles; and achieving a sense of balance between work and home responsibilities. (Table 3)

Focus group participants found decision-making around fertility significantly impacted by lengthy medical training. Participants described their primary dilemma as waiting until training was complete before having children and thereby potentially risking "fertility problems" versus having children during training, a particularly time-intense period also marked by a relatively low salary and limited control over one's schedule.

Focus group participants cited their responsibility for the wellbeing of others as the primary distinguishing factor between themselves and other working mothers. They described caring for patients as requiring a level of emotional investment similar to that expected at home as parents. Childcare posed another challenge due to the unpredictable and long work hours associated with medicine. Benefits to being both a physician and mother included enhanced empathy for patients, relieved

stress surrounding common childhood ailments, as well as serving as role models to their own children.

Participants commented that the role of physician-mother is more stressful if a partner or spouse has a time-intense job, no matter what the career. Four of the six participants who were married to other physicians explicitly described the support and understanding that comes from being married to someone else in the same field, a key benefit of the two-doctor household.

Regarding the challenge of balancing home and work, participants cited examples from the workplace including unsupportive colleagues and a perceived misalignment in values with some older physician-mothers. Parental leave policies—or lack thereof—were of particular concern for all participants. Compound-

ing factors included pressure from other parents, teachers, and their own children who compared participants to stay-at-home mothers.

Focus group members also acknowledged that medicine enables employment options that provide the possibility of better work-life balance. Four participants held part-time positions in four different specialties and three different work environments, although only one was satisfied with her contract. The others described continued long hours and nights or week-ends on-call that had not been reduced on a pro-rated basis to reflect their part-time work status.

All groups expressed that informal mentorship among physician-mothers had been helpful when striving to balance work and home.

### MDF participation and suggestions for the future

Although 92% of respondents reported using the organization's listserv for both personal and professional reasons, only 30% reported attending quarterly MDF events. (Table 4) The primary barriers to participation in MDF events posited by focus group participants were time constraints and being overcommitted.

Three recurrent themes emerged from the focus groups about the benefits of MDF participation: a time-saving way to share information; providing guidance in professional development; and helping to reduce any sense of isolation. Participants also commented on the utility of MDF's web-based structure and made suggestions for enhancing it such as providing a list of vetted childcare providers.

**Table 3. Challenges faced by physician-mothers based on focus group analysis.**

| Challenges   | Possible Sequelae   | Can be Compounded by:  | Can be Mitigated By:   |
|--|---|--|--|
| <b>A career in medicine requires extensive training</b>  | <ul style="list-style-type: none"> <li>- Delay in starting a family</li> <li>- "Fertility problems", leading to anxiety, feeling of loss of control</li> <li>- Absence during and after childbearing can cause resentment by other trainees.</li> </ul>   | <ul style="list-style-type: none"> <li>- Lack of control over schedule</li> <li>- Time-intensive schedule</li> <li>- Unsupportive administration</li> <li>- "It was very clear that...our chair did not want us getting pregnant during residency. And [he] would actually say that."</li> <li>- Lack of financial resources if parenting while still in training</li> <li>- Potentially lengthened time to conception or infertility</li> </ul>   | <ul style="list-style-type: none"> <li>- Acceptable parental leave policies within training programs (for trainees)</li> <li>- Positive informal and formal mentorship</li> <li>- As a mother, experiencing enhanced sense of empathy for patients</li> <li>- Supportive partner/spouse</li> <li>- Extended family</li> </ul>  |
| <b>Responsibility for the health and well-being of others</b><br>- Double the emotional investment<br><i>"I think when you're a physician you're taking care of people, so it's not like, "Oh well maybe if I don't do my job as well today because I have to rush out to the kids then some company will lose some money." It's not about that. I think that role of being emotionally invested and having to do it well is something that applies both to being a physician and to being a parent and so it's just - there is only so much you can do, so I think it's... that constant back and forth."</i> | <ul style="list-style-type: none"> <li>- Difficult to take sick leave (for self or for children) or leave early for home emergencies</li> <li>- Difficult to utilize childcare facilities with 'normal' working hours</li> <li>- "When we make a decision at work it can be [about] life or death. Versus somebody else [who] misses a deadline, they miss a deadline. I mean... if somebody's having chest pain at 5 o'clock, and we're supposed to be picking somebody up from daycare, we're not leaving. If somebody isn't making a deadline at 5 o'clock, they leave."</li> </ul>  | <ul style="list-style-type: none"> <li>- Unsupportive colleagues</li> <li>- Work environment</li> <li>- Partner/spouse with time-intense job can make it challenging to negotiate priorities</li> <li>- "In theory, [my husband is] very supportive. But, the practicalities are... I think he has a panic attack of, "Well, this is really important and I don't know how to do this and my boss and the job and the client," and [my response is] "But, we have the child, and he's sick and what are we going to do about that," so... I do end up being the one having to think out of the box and [be] more flexible and I have the stress of organizing everything and he tries his best but... It became clearer [as the children got older] that I would have to be the backup person for everything. [And] I think even if I had his job and he had mine, then he would say, "I'm taking care of sick babies," and I would be the one saying, "Well, I guess I can come home from LA and I can try to do a conference call..."</li> </ul> | <ul style="list-style-type: none"> <li>- Coverage of clinical or other work responsibilities in emergencies by understanding colleagues</li> <li>- Partner who inherently understands the pressure of the workplace, i.e. physician-spouse</li> <li>- Partner/spouse who shares equally in household division of labor</li> <li>- Ability to distinguish 'serious' from 'not-so-serious' ailments in own children</li> </ul>   |
| <b>Achieving a sense of balance between work and home responsibilities</b>   | <ul style="list-style-type: none"> <li>- Fear that negotiation for (more) time will lead to resentment from colleagues</li> <li>- Shifting priorities to accommodate both roles</li> <li>- Fatigue</li> <li>- Sense of sadness and isolation</li> <li>- "[M]y husband works full time as...a professor. We have this battle as to who's more stressed and who needs to get their work done... but I don't think he understands my work issues and I don't think I necessarily understand the urgency of his work issues. I think if you had a physician-spouse, then you might understand each other's needs a little bit more..."</li> </ul> | <ul style="list-style-type: none"> <li>- Long hours</li> <li>- Unsupportive work environment, including unsupportive colleagues and inadequate or absent parental leave policies</li> <li>- Difficulty in obtaining acceptable part-time employment</li> <li>- Generation gap with older physician-mothers</li> <li>- Partner/spouse with time-intense job</li> <li>- Imbalanced division of labor</li> <li>- Pressure from non-physician parents, teachers, children, etc.</li> <li>- "[T]here's this whole thing about being involved in the school and baking and doing all that stuff... I'll try to explain to [my physician-husband] why there's this [pressure to bake, etc.], and he's like, "Why do you care, you're working! You know you don't have to do that stuff." But, he doesn't get that same pressure. Nobody's gonna say [to him], "Why didn't you bake cookies?" or think that in their head. It's different when you're a woman because the expectations are different."</li> </ul>  | <ul style="list-style-type: none"> <li>- Choosing a more flexible career path within medicine</li> <li>- Effective negotiation for more acceptable work policies/contract, including parental leave policies, part-time work schedule</li> <li>- Changing work priorities to accommodate family</li> <li>- Informal mentorship to/from other physician-mothers</li> <li>- Experiencing enhanced sense of empathy for patients</li> <li>- Partner who inherently understands the pressure of the workplace, i.e. physician-spouse.</li> <li>- Partner/spouse who shares equally in household division of labor</li> <li>- Recognizing self as role-model for children (especially daughters)</li> </ul> |

**Table 4. Member utilization of MDF and suggestions for future directions.**

| Survey                               | % (No.)   | Focus Groups  |  |
|--------------------------------------|-----------|---|--|
| Why use MDF listserv*                |           | <b>Benefits of participation in MDF</b>                               | Time-saver<br>Ex: “[MDF] is organized in a way that really suits this lifestyle of MomDocs”<br>Ex: “I think [MDF has] been helpful for...really small things to really big things. [T]he small things that I think are helpful are... finding a nanny or, where do you do x, y, and z and you just don’t know and you don’t have time to talk with all these other moms at the park at 3 pm...”  |
| Both personal and professional       | 46.0 (34) |   | Professional networking/development<br>Ex: “When I was trying to find a job [knowing] I have to support my family, and I don’t know what the salaries are here, I met with a member privately, and she...gave me some tips on negotiation, and I [thought] this is the kind of stuff they should teach you in residency but they don’t... It’s support, but support in a way that is very business and practical oriented. I know how to nurse... I need more practical help.” |
| Exclusively personal                 | 46.0 (34) |   | Reduces sense of isolation<br>Ex: “The other [way that MDF has been helpful] for me has been just hearing stories... and saying, OK, I’m not alone, I’m not the only one who goes through these crises and has bad days and it’s just very, very nice for me to know that there are other people out there... it’s just nice to know that somehow I’m not crazy, I have not made a lot of bad decisions, it’s just life.”  |
| Exclusively professional             | 0 (0)     | <b>Obstacles to participation in MDF-sponsored events/initiatives</b> | Time constraints, already feeling overcommitted  |
| Have not used it                     | 8.1 (6)   | <b>Suggestions for future (from both surveys and focus groups):</b>   | Web materials<br>- Readily accessible email archives<br>- Blog or other private web-based forum to share insights about specific personal and professional topics  |
| Avg. no. MDF events attended per yr† |           |   | Mentorship opportunities arranged around specific areas of interest  |
| 0                                    | 70.5 (55) |   | Geographically based networking events   |
| 1-2                                  | 26.9 (21) |   |  |
| 3-4                                  | 2.6 (2)   |   |  |

\* Listserv “usage” includes both reading emails as well as actively posting messages.

† There are an average of four MDF events held per year.

**DISCUSSION**

The current study is among the first to evaluate an organization exclusively devoted to supporting physician-mothers. The mixed-methods design enabled us to assess the organization’s demographics and utilization as well as better understand the unique experiences faced by a large group of physician-mothers.

Similar to what has been shown in other studies, the majority of MDF physician-mothers work more than 40 hours per week,<sup>5</sup> have partners or spouses who also work full-time,<sup>6,7</sup> and are more often responsible for childcare than their partners or spouses.<sup>7</sup> These professional and personal pressures resulted in feelings of fatigue and isolation compounded by little to no infrastructure within medical institutions to address (and accommodate for) these challenges.

In our study, 22% of physician-mothers reported working part-time. Part-time employment is increasingly popular among women physicians in clinical and academic settings in order to accommodate family obligations.<sup>8,9</sup> Challenges to part-time work as described by focus group participants include difficulty negotiating fair contracts and negative perceptions by colleagues and supervisors, which is consistent with findings from prior research.<sup>8</sup> Ironically, part-time physicians have been shown to be more productive and cost-effective for em-

ployers than their full-time counterparts.<sup>10,11</sup> Although it has been reported that male spouses currently provide more support at home than in previous decades,<sup>6</sup> our study is consistent with other research revealing that physician-mothers still provide the majority of childcare in their homes regardless of their own work schedule.<sup>12,13</sup>

Another salient study finding is the absence of full professors and the low number of associate professors (9.1%) among the respondents in academic medicine despite the high percentage of academic physicians (37%) who had been out of training for more than seven years. While some senior women may have remained hidden in the 30% of MDF members who did not respond to the survey, this lack of female full or associate professors is not unique to MDF.<sup>5,14,15</sup> Increased recognition of a “leaky pipeline” phenomenon among women in academic medicine has led to several proposed solutions including pro-rated tenure time-lines and flexible work schedules.<sup>9,16</sup> Our study findings fully support these initiatives as appropriate steps to address the realities faced by women physicians who are parents.

Our study also highlighted the tangible benefits of a network of physician-mothers who can share strategies and promote one another’s professional and personal success. MDF’s web-based approach is a time-efficient resource for both profes-

sional and personal needs and its on-line community reduces the sense of isolation for busy physician-mothers. The MDF structure promotes informal mentorship linkages between physician-mothers and may be characterized as a peer-mentoring program. Mentorship programs in general have been associated with more scholarly productivity<sup>17</sup> and peer-mentoring models in particular with a heightened sense of empowerment.<sup>18-20</sup> Because peer-mentoring often involves a group of people, pressure on any one individual to fulfill her role may be minimized. This flexibility may be especially accommodating for individuals with time-intense schedules.<sup>21</sup>

A limitation to this study was, ironically, the busy schedules of physician-mothers potentially limiting participation in the survey and/or focus groups. It is reassuring that responders and non-responders did not differ significantly in terms of specialty or career level. Additionally, because this study was an assessment of a specific organization, the characteristics of physician-mothers described here apply only to MDF members who were members in June of 2009.

In conclusion, MomDocFamily is a regional organization that fills critical gaps in the typical support systems available to physician-mothers by providing professional and personal mentoring conducted primarily on-line. This study clarifies prior research

on the unique challenges faced by this key sector of the medical workforce. It also provides suggestions for further development of this groundbreaking organization.

*MDF welcomes any medical student or physician who is a mother to join the organization via its website: <http://biomed.brown.edu/lowims/MomDocFamily>.*

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### Disclosure of Financial Interest

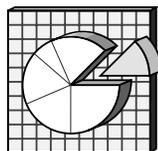
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## Pregnancy Outcomes In an Initiative Preceding Onset of Prenatal Care

Alvaro M Tinajero, MD, MPH, ScM

**ABOUT ONE IN TWELVE INFANTS BORN IN RHODE ISLAND DURING 2004–2006** were low birth weight and nearly one in ten were premature.<sup>1</sup> These conditions greatly increase the risk of perinatal complications and of disability and poor health across the life course. Nationally, there is evidence of preconception care effectiveness for screening/referral of reproductive risks, folate supplementation, and treatment of metabolic conditions.<sup>2</sup> Research evidence indicates that improvements in birth outcomes require pregnancy readiness and appropriate antenatal care, and that low birth weight and prematurity reductions cannot be achieved solely by improving access to reproductive services and prenatal care.<sup>3,4</sup> The 2005 National Preconception Care Summit recommended the evaluation of interconception care and care coordination models for women with high social and medical risks.<sup>5</sup>

Rhode Island Title X agencies started offering the **Women Health Screening and Referral Program (WHSRP)** in 1998 as a no-cost pregnancy testing and health risk management strategy for women who believe they may be pregnant. Women complete a questionnaire while they wait for test results. Their responses help Title X staff assess their health risks to link them with appropriate services before or early in pregnancy, when preventing and treating potential health problems provides greater benefits to the mother and child. This evaluation was conducted to determine whether the WHSRP has influenced birth weight and gestational age and if there is evidence to support funding continuation. Funding for this program ended in November 2010.

### METHODS

This study compared pregnancy outcomes of women receiving screening/referral with community controls not receiving these services. Birth information was provided by the Rhode Island Birth File and consisted of 31,979 women with a live birth during 2004–2006. Birth records confirmed whether each woman had a low birth weight (<2500 grams), high birth weight (>4,250 grams), and/

or preterm delivery (<37 weeks of gestation). Records were linked using delivery date, maternal date of birth and zip code with Title X and WHSRP databases to determine whether, before starting prenatal care, they: a) participated in the WHSRP (N=708); b) visited a Title X agency but did not participate in the WHSRP (N=477); or c) received no WHSRP or Title X services (N=30,794). Algorithms verified the correspondence of race/ethnicity in linked records, and the window of exposure to Title X or WHSRP. Women were considered exposed if they had a Title X visit with a positive pregnancy test after the date of their **last menstrual period (LMP)** and before starting prenatal care. An error margin for the LMP of +/- 3 weeks helped account for potential recall bias and/or menstrual irregularities. Linked records not meeting one or more of these criteria were not considered exposed to Title X (model 2) or WHSRP (model 1) and were reclassified as community controls (model 3). Re-

**Table 1**  
Pregnancy Outcomes in Models 1 and 3 Controlling for Educational Level and Age (All Births and Core Areas)

| Variable Levels            | Outcome Compared                     | MH Chi-Sq p     | Stratum-Specific OR (95% CI)           | Breslow-Day p | CMH p | Adjusted OR (95% CI) |
|----------------------------|--------------------------------------|-----------------|--|---------------|-------|----------------------|
| <b>All Births</b>          |                                      |                 |  |               |       |                      |
| HS or less and age 21-34   | <b>Birth Weight</b>                  |                 |  |               |       |                      |
|                            | Lbw (<2500)<br>Nbw (2500-4250)       | Ns              | 1.5171 (0.9777-2.3542)                 |               |       |                      |
| More than HS and age 21-34 | <b>Birth Weight</b>                  |                 |  |               |       |                      |
|                            | Lbw (<2500)<br>Nbw (2500-4250)       | Hs****          | 11.6796 (2.0514-465.5811) <sup>1</sup> | S*            | Vs**  | 1.5067 (1.1079-2.04) |
| HS or less and age 21-34   | <b>Gestational Age</b>               |                 |  |               |       |                      |
|                            | Premature (<37)<br>Full term (37-42) | S*              | 1.5614 (1.0244-2.3800)                 |               |       |                      |
| More than HS and age 21-34 | <b>Gestational Age</b>               |                 |  |               |       |                      |
|                            | Premature (<37)<br>Full term (37-42) | Ns              | 1.6987 (0.7906-3.6502)                 | Ns            | S*    | 1.3896 (1.0453-1.84) |
| <b>Singleton Births</b>    |                                      |                 |  |               |       |                      |
| HS or less and age 21-34   | <b>Birth Weight</b>                  |                 |  |               |       |                      |
|                            | Lbw (<2500)<br>Nbw (2500-4250)       | Ns              | 1.5019 (0.9486-2.3779)                 |               |       |                      |
| More than HS and age 21-34 | <b>Birth Weight</b>                  |                 |  |               |       |                      |
|                            | Lbw (<2500)<br>Nbw (2500-4250)       | Vs***           | 9.8935 (1.7370-394.4516) <sup>1</sup>  | S*            | S*    | 1.4180 (1.0355-1.94) |
| <b>Core Areas</b>          |                                      |                 |  |               |       |                      |
| HS or less and age 21-34   | <b>Birth Weight</b>                  |                 |  |               |       |                      |
|                            | Lbw (<2500)<br>Nbw (2500-4250)       | Ns              | 1.3148 (0.7945-2.1758)                 |               |       |                      |
| More than HS and age 21-34 | <b>Birth Weight</b>                  |                 |  |               |       |                      |
|                            | Lbw (<2500)<br>Nbw (2500-4250)       | S* <sup>1</sup> | 7.0100 (1.2145-281.0423) <sup>1</sup>  | Ns            | Ns    | 1.3481 (0.9440-1.92) |
| HS or less and age 21-34   | <b>Birth Weight</b>                  |                 |  |               |       |                      |
|                            | Hbw (<2500)<br>Nbw (2500-4250)       | S* <sup>1</sup> | 2.7266 (1.0313-10.2083)                |               |       |                      |
| More than HS and age 21-34 | <b>Birth Weight</b>                  |                 |  |               |       |                      |
|                            | Hbw (<2500)<br>Nbw (2500-4250)       | Ns              | 0.7706 (0.3109-2.4696)                 | Ns            | Ns    | 1.5818 (0.8619-2.90) |
| HS or less and age 21-34   | <b>Gestational Age</b>               |                 |  |               |       |                      |
|                            | Premature (<37)<br>Full term (37-42) | S*              | 1.6802 (1.0181-2.7728)                 |               |       |                      |
| More than HS and age 21-34 | <b>Gestational Age</b>               |                 |  |               |       |                      |
|                            | Premature (<37)<br>Full term (37-42) | Ns              | 1.2502 (0.5740-2.7228)                 | Ns            | Ns    | 1.3774 (0.9950-1.90) |

\* significant  
\*\* very significant  
\*\*\* highly significant  
<sup>1</sup> Fisher exact test/FY test confidence limits

**Table 2**  
**Pregnancy Outcomes in Models 1 and 3 Controlling for Educational Level and Age (Hispanics)**

| Variable Levels            | Outcome Compared                     | MH Chi-Sq p | Stratum-Specific OR (95% CI)          | Breslow-Day p | CMH p | Adjusted OR (95% CI)   |
|----------------------------|--------------------------------------|-------------|---------------------------------------|---------------|-------|------------------------|
| <b>All Births</b>          |                                      |             |                                       |               |       |                        |
| <b>Birth Weight</b>        |                                      |             |                                       |               |       |                        |
| HS or less and age 21-34   | Lbw (<2500)<br>Nbw (2500-4250)       | S*          | 2.7421 (1.1265-8.6786)                | Ns            |       |                        |
| More than HS and age 21-34 | Lbw (<2500)<br>Nbw (2500-4250)       | Ns          | zero cell—not computed                | Ns            | Vs**  | 2.1890 (1.2155-3.9422) |
| HS or less and age 21-34   | Hbw (<2500)<br>Nbw (2500-4250)       | Ns          | 1.4131 (0.5701-4.5276) <sup>1</sup>   |               |       |                        |
| More than HS and age 21-34 | Hbw (<2500)<br>Nbw (2500-4250)       | Hs***       | 0.1929 (0.0760-0.4895)                | S*            | Ns    | 0.7630 (0.4283—1.3593) |
| <b>Gestational Age</b>     |                                      |             |                                       |               |       |                        |
| HS or less and age 21-34   | Premature (<37)<br>Full term (37-42) | S*          | 2.2650 (1.0987-4.6692)                |               |       |                        |
| More than HS and age 21-34 | Premature (<37)<br>Full term (37-42) | Ns          | 4.8609 (0.8071-198.3595) <sup>1</sup> | Ns            | S*    | 1.8104 (1.1128-2.9455) |
| <b>Singleton Births</b>    |                                      |             |                                       |               |       |                        |
| <b>Birth Weight</b>        |                                      |             |                                       |               |       |                        |
| HS or less and age 21-34   | Lbw (<2500)<br>Nbw (2500-4250)       | S*          | 2.5686 (1.0538-8.1373) <sup>1</sup>   |               |       |                        |
| More than HS and age 21-34 | Lbw (<2500)<br>Nbw (2500-4250)       | Ns          | zero cell—not computed                | Ns            | S*    | 2.0363 (1.1298-3.6700) |
| HS or less and age 21-34   | Hbw (<2500)<br>Nbw (2500-4250)       | Ns          | 1.4102 (0.5688-4.5188) <sup>1</sup>   |               |       |                        |
| More than HS and age 21-34 | Hbw (<2500)<br>Nbw (2500-4250)       | Hs***       | 0.1946 (0.0767-0.4938)                | S*            | Ns    | 0.7637 (0.4286-1.3607) |
| <b>Gestational Age</b>     |                                      |             |                                       |               |       |                        |
| HS or less and age 21-34   | Premature (<37)<br>Full term (37-42) | S*          | 2.1442 (1.0393-4.4236)                |               |       |                        |
| More than HS and age 21-34 | Premature (<37)<br>Full term (37-42) | Ns          | 4.2532 (0.7045-173.7608) <sup>1</sup> | Ns            | S*    | 1.7007 (1.0445-2.7690) |
| <b>Core Areas</b>          |                                      |             |                                       |               |       |                        |
| <b>Birth Weight</b>        |                                      |             |                                       |               |       |                        |
| HS or less and age 21-34   | Lbw (<2500)<br>Nbw (2500-4250)       | Ns          | 2.2457 (0.9149-7.1469) <sup>1</sup>   |               |       |                        |
| More than HS and age 21-34 | Lbw (<2500)<br>Nbw (2500-4250)       | Ns          | zero cell—not computed                | Ns            | S*    | 2.0067 (1.0836-3.7164) |
| HS or less and age 21-34   | Hbw (<2500)<br>Nbw (2500-4250)       | Ns          | 1.7167 (0.6295-6.5532) <sup>1</sup>   |               |       |                        |
| More than HS and age 21-34 | Hbw (<2500)<br>Nbw (2500-4250)       | Vs***       | 0.2041 (0.0694-0.7374) <sup>1</sup>   | S*            | Ns    | 0.8657 (0.4628-0.6194) |
| <b>Gestational Age</b>     |                                      |             |                                       |               |       |                        |
| HS or less and age 21-34   | Premature (<37)<br>Full term (37-42) | Ns          | 1.9447 (0.9388-4.0284)                |               |       |                        |
| More than HS and age 21-34 | Premature (<37)<br>Full term (37-42) | Ns          | 4.4767 (0.7320-183.8474) <sup>1</sup> | Ns            | S*    | 1.6914 (1.0227-2.7974) |

\* significant  
 \*\* very significant  
 \*\*\* highly significant  
<sup>1</sup> Fisher exact test/Exact confidence limits

age 21-34 from all state areas and women of similar ages living in core areas of the state (Providence, Pawtucket, Central Falls, Woonsocket, West Warwick, and Newport). Stratum-specific odds ratios were used to report study estimates. This was due to the large effect modification observed for educational level and age on the model of care/pregnancy outcomes relationship. Women age 21-34 with more than a high school education and who did not participate in the WHSRP were almost 12 times more likely to deliver a low birthweight baby than their WHSRP peers (Table 1). Women age 21-34 with less education not participating in the WHSRP were about 1.6 times more likely to deliver prematurely than WHSRP women. Similar findings and differences across age and educational levels were observed among women living in core areas. Hispanic women benefited the most from early pregnancy risk assessment/referral, particularly those with less education. Less-educated Hispanic women age 21-34 not participating in the WHSRP were almost three times more likely to have a low birthweight baby and 2.3 times more likely to deliver prematurely compared to their WHSRP counterparts (Table 2). Hispanic women also had the highest rates of WHSRP participation, representing almost 50% of participants both statewide and in core areas. Findings for Hispanic women suggest similar program benefits for women of other racial/ethnic groups, though these analyses could not fully account for a similar effect because some

cords with unclassified race/ethnicity information (N=5,587 or 17.5%) were excluded from the racial/ethnic group analysis but were part of the overall analysis. Relationships between models of care and pregnancy outcomes were tested via chi-square (crude odds ratio), Mantel-Haenszel (stratum-specific odds ratios) and Cochran-Mantel-Haenszel (adjusted odds ratio) analyses. Fisher exact test and exact calculation of OR confidence limits was used when there were <5 observations per cell. All information including that used for data linkages excluded personal identifiers. The Rhode Island Department of Health Institutional Review Board approved this project in February 2010.

**RESULTS**

Overall, after controlling for educational level and maternal age at delivery, women receiving health risk screening/referral before prenatal care started were less likely to have low birth weight babies and premature deliveries than women who received no program or Title X-only services. The greatest benefits occurred among women

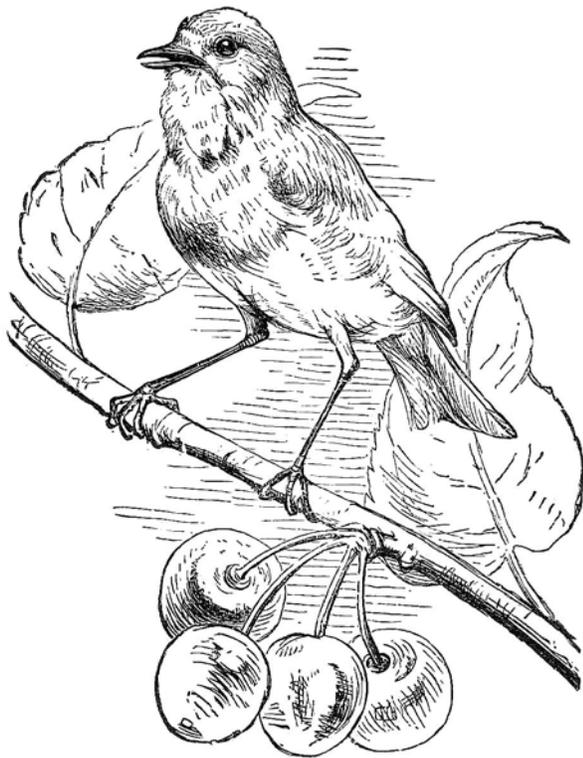
strata had no observations. While most race/ethnic-specific analyses showed better pregnancy outcomes associated with WHSRP participation, one exception exists. Hispanic participants age 21-34 with more than a high school education were 80% more likely to have a high birthweight baby than their model 3 counterparts. This occurred for the entire Hispanic population and for Hispanics in core areas. This finding may represent a potential risk for other program participants, especially for minorities with sample sizes that were insufficient for analysis.

Pregnancy outcomes for women who received only Title X services did not differ significantly from those for women who received neither Title X nor WHSRP services. This suggests that, for pregnant women with a live birth, lower risks for WHSRP participants stemmed mainly from early screening/referral and follow-up care, rather than from other Title X services. As the analysis found no significant differences in pregnancy outcomes between women receiving WHSRP versus Title X-only services, this indirect evidence is inconclusive.

## DISCUSSION

After adjusting for age and educational level, health assessments/referrals provided prior to the onset of prenatal care are associated with better birth weight and gestational age. This occurred mainly among 21 through 34 year-old women of all educational levels and Hispanic women with less education.

Pregnancy testing is often the first point of access to care for pregnant and non-pregnant women. Removing financial barriers by offering free pregnancy tests, risk screening, and referral to Title X clients before prenatal care begins can help link pregnant women with needed care and give their newborns a healthier start in life. Health risk screening/referral initiatives may be especially important for women with unintended pregnancies. In Rhode Island, these women are significantly more likely than those with intended pregnancies to report having delayed or no prenatal care (24.5% versus 9.3%). They are also more likely to report other pregnancy risks, such as smoking or experiencing intimate partner violence during pregnancy.<sup>6</sup> Despite evidence supporting WHSRP benefits, this evaluation has several limitations. First, study methodology is not appropriate for establishing causality between an early pregnancy intervention model and birth outcomes. This requires a longitudinal study design with cohort follow-up. The study did not assess explanatory factors that



may account for model differences. In addition, it used broad age categories (<21, 21-34, and 35+). Subsequent analyses will assess explanatory factors and possible residual confounding by age (i.e., if risk varied within categories). Sample sizes of some racial/ethnic groups were insufficient to arrive at meaningful conclusions. This suggests the need for additional outreach to Rhode Island non-Hispanic minorities, especially Southeast Asians, Native American Indians, and African Americans.

The Institute of Medicine estimates that in 2005 preterm birth cost US society \$26 billion.<sup>7</sup> In 2008, two-thirds of all low-weight births in the United States were premature.<sup>8</sup> To prevent perinatal complications and reduce health care costs from high-risk pregnancies, Rhode Island should reconsider funding for initiatives that address social and medical risks before or early in pregnancy.

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The author has no financial interests to disclose.

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# Images In Medicine

## Intercoronary Connection Between the Right Coronary Artery and Left Circumflex Artery in the Absence of Obstructive Coronary Disease and Collaterals

Syed R. Latif, MD, Alexander G. Truesdell, MD, and Thomas Drew, MD

### INTRODUCTION

Collateral coronary arteries are normally recruited in response to myocardial ischemia and the presence of collateral coronary blood flow is almost always indicative of significant underlying obstructive disease. Rarely however, intercoronary communications distinct from collaterals exist between two native coronary arteries in the absence of obstructive disease the significance of which is not clear.

### CASE REPORT

A 59 year-old male with a history of remote prior myocardial infarction presented to the hospital complaining of intermittent exertional substernal chest pressure in the absence of electrocardiographic changes or cardiac biomarker elevations. An outpatient noninvasive myocardial perfusion study demonstrated normal regional and global systolic function with a reversible apical inferior perfusion defect consistent with ischemia in the territory of the right coronary artery. At subsequent cardiac catheterization, left ventriculography demonstrated normal global and regional systolic function and coronary angiography demonstrated normal left coronary

arteries. The right coronary artery (RCA) had a minimal lesion in the proximal vessel estimated to be a 20% stenosis. Selective injection of this vessel demonstrated retrograde filling of the entire left circumflex coronary artery, whereas left coronary injection did not fill the right coronary artery – consistent with a unidirectional intercoronary communication. The injection of the right coronary artery was not associated with dampening of the catheter pressure which occurs when the catheter is occlusive during the injection. The proximal right coronary artery lesion was subsequently interrogated by fractional flow reserve, which demonstrated a non-hemodynamically significant stenosis. Due to the size and morphology of the communication between the right coronary artery and the left circumflex coronary artery and the absence of significant underlying coronary artery disease this likely represented a rare (and probably congenital) primary intercoronary communication rather than a collateral.

### DISCUSSION

Collateral circulation is well recognized as an anatomic adaptation of the circulatory system to impaired blood flow through the native arterial system due to intraluminal obstruc-

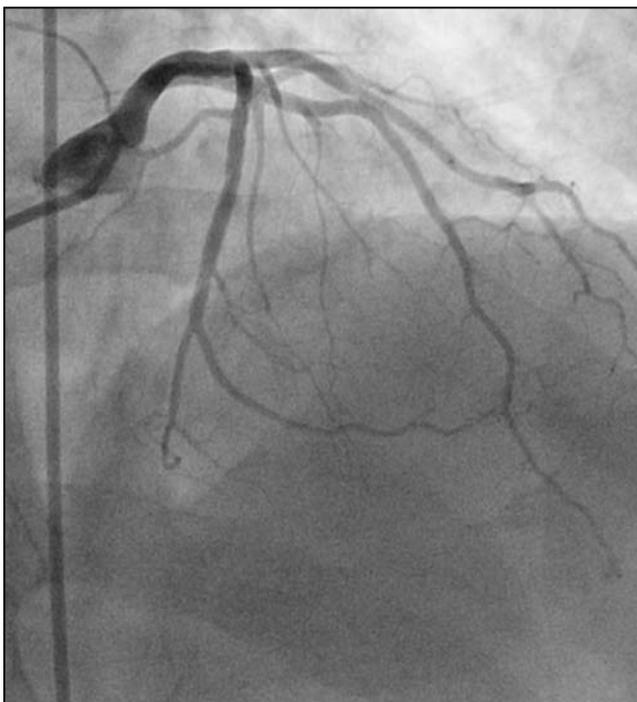


Figure 1.

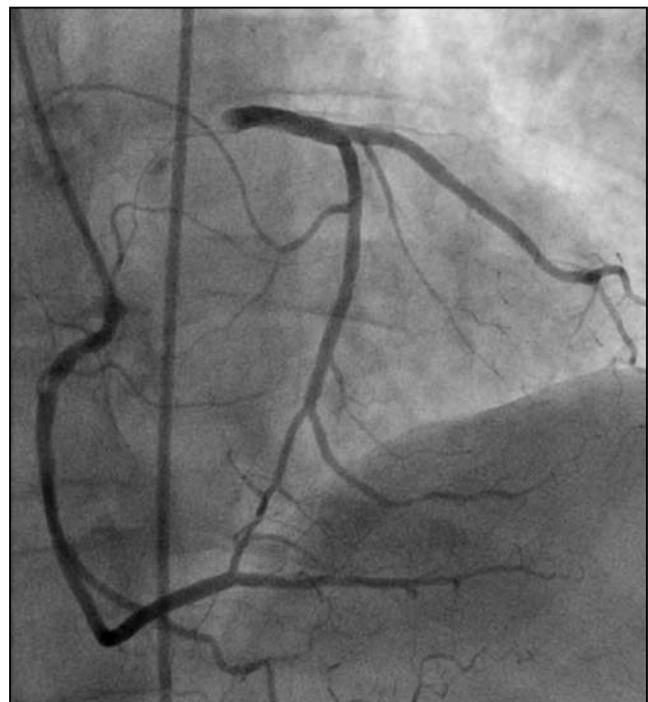


Figure 2.

tion. Intercorony communication, on the other hand, is a rare condition that may arise from several different possibilities.

The first possibility is that this is a congenital condition in which there is an open-ended circulation with bidirectional (or even more rarely, unidirectional) flow between two coronary arteries in the absence of obstructive coronary artery disease. The few case reports published worldwide, whether flow was unidirectional or bidirectional, there was always flow from right to left, the functional significance of which is unknown.

Another possibility is that there was previously obstructive disease present in the RCA, which led to the development of collaterals. Then with regression of the obstruction (decrease in plaque volume or positive remodeling) this may produce the findings that were documented at the time of catheterization.

Still, a third possibility is that the collateral circulation typical of obstructive coronary disease was not well visualized at the time of angiography. Contrast was not re-injected into the LCA again after the RCA. Contrast is known to be vasodilatory and it is possible that we would have seen the collaterals flowing left to right at the end of the procedure.

Intercorony communications can usually be distinguished from collateral arteries by its angiographic features, and in and of itself does not reflect any underlying coronary artery disease. It is possible that it may play a protective role if obstructive lesions develop in either of the two linked vessels. Alternatively it might also produce artifactual ischemia on myocardial perfusion imaging due to competitive flow through the unidirectional communication – or perhaps even true ischemia if the unidirectional communication creates a coronary steal phenomenon leading to inadequate perfusion of the myocardial territory served by one of the interconnected arteries, which may explain the patient's symptoms and abnormal perfusion study.

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# Physician's Lexicon

## An Interbreeding of Germanic and Mediterranean Words

**WE TEND TO DESCRIBE, IN EVERY-DAY** conversation, human body parts using the words that our Anglo-Saxon forebears had employed. But even those mundane words persist in demonstrating some contamination from Greek and Latin influences in their formation.

Consider the word, knee, clearly a term of Germanic origin. But why the silent 'k'? A similar persistence of the silent 'k' is witnessed in words such as knave, knead and knapsack. The word, knee, descends originally from an Indo-European ancestor, *goneu*, meaning 'to bend' and then through alternate lexical pathways, giving rise to the Latin, *genu*, the French, *genou*, and the Italian, *ginocchio*, and a very early German word, *knewam*, and the Dutch, *knie*. And thus the 'k', as an audible sound, was lost when English became an independent language, but it persisted in the written form. A cluster of contemporary words stem from these primitive roots:

genuect, kneel and geniculate (bent like a knee as in *corpus geniculatum*.)

And in classical Greek? The word became the root, *gonia*, meaning an angle, a bending, evolving thence into common words such as polygon, diagonal, pentagon and trigonometry.

And the word, genuine? It is derived from the Latin, *genuinis*, meaning inborn, native, even natural. And earlier, from *ingenuus*, meaning native or free-born (as in the English, ingenuous, something inherently talented); and ultimately from the Indo-European root, *gen*, meaning to beget (as in words such as generate, genes, genetics).

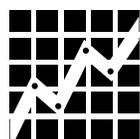
The combining form, *gony-* pertains to the knee; while the combining form *-gony*, however, signifies generation, origin, sexuality as in cosmogony or gonad.

The vertebrate joint distal to the knee is commonly called the ankle, a word also of Germanic origin, *enke*, and its diminutive form, *enkel*, meaning a joint, or that

which bends. It shares a yet earlier meaning with the Latin, *angulus* (meaning a corner or an angle – the figure formed by two intersecting lines.) And it is etymologically related to the Greek combining form, *ankylo-*, meaning bent, crooked or abnormally curved. The medical term, ankylosis, descends directly from this root.

The main lexical streams that took origin from the primitive Indo-European tongue(s) did not flow through history in total isolation without some intermingling with parallel streams of evolving languages. And thus, while Anglo-Saxon terminology tends to be etymologically discrete from the Classical Mediterranean languages, there is more than sufficient evidence of cross-breeding during the many centuries of their parallel, quasi-independent evolution.

– STANLEY M. ARONSON, MD



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## VITAL STATISTICS

EDITED BY COLLEEN FONTANA, STATE REGISTRAR

### Rhode Island Monthly Vital Statistics Report Provisional Occurrence Data from the Division of Vital Records

| Underlying Cause of Death             | Reporting Period |                                 |           |          |
|---------------------------------------|------------------|---------------------------------|-----------|----------|
|                                       | June 2011        | 12 Months Ending with June 2011 |           |          |
|                                       | Number (a)       | Number (a)                      | Rates (b) | YPLL (c) |
| Diseases of the Heart                 | 172              | 2,395                           | 227.4     | 3,532.0  |
| Malignant Neoplasms                   | 167              | 2,214                           | 210.2     | 5,546.5  |
| Cerebrovascular Diseases              | 36               | 442                             | 42.0      | 709.5    |
| Injuries (Accidents/Suicide/Homicide) | 58               | 638                             | 60.6      | 9,388.0  |
| COPD                                  | 44               | 546                             | 51.8      | 412.5    |

| Vital Events             | Reporting Period |                                     |        |
|--------------------------|------------------|-------------------------------------|--------|
|                          | December 2011    | 12 Months Ending with December 2011 |        |
|                          | Number           | Number                              | Rates  |
| Live Births              | 901              | 11,721                              | 11.1*  |
| Deaths                   | 858              | 9,700                               | 9.2*   |
| Infant Deaths            | (4)              | (75)                                | 6.4#   |
| Neonatal Deaths          | (3)              | (57)                                | 4.9#   |
| Marriages                | 292              | 6,262                               | 5.9*   |
| Divorces                 | 252              | 3,320                               | 3.2*   |
| Induced Terminations     | 319              | 4,159                               | 354.8# |
| Spontaneous Fetal Deaths | 62               | 635                                 | 54.2#  |
| Under 20 weeks gestation | (54)             | (540)                               | 55.7#  |
| 20+ weeks gestation      | (8)              | (93)                                | 7.9#   |

(a) Cause of death statistics were derived from the underlying cause of death reported by physicians on death certificates.

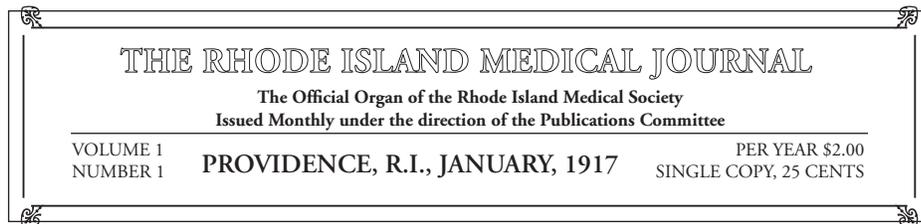
(b) Rates per 100,000 estimated population of 1,052,567. ([www.census.gov](http://www.census.gov))

(c) Years of Potential Life Lost (YPLL).

*Note: Totals represent vital events that occurred in Rhode Island for the reporting periods listed above. Monthly provisional totals should be analyzed with caution because the numbers may be small and subject to seasonal variation.*

\* Rates per 1,000 estimated population

# Rates per 1,000 live births



## **NINETY YEARS AGO, JUNE, 1922**

Eric Stone, MD, and James McCann, MD, discuss the significance of bladder symptoms in women following various clinical studies at the instigation of the Gynecological Staff at Rhode Island Hospital. They looked procedures and methods of examination as well as catheterizations and microscopic examinations. Among their discoveries was that 38% of cases with a diagnosis already made were found to be incorrect, and that one in five were presented as a cystitis when the bladder masked a more important condition in the upper urinary tract or in the pelvis. Furthermore, urological exams saved five patients surgical attack on appendix or tubes, and finally the importance of the cystoscope in the armamentarium of the gynecologist is clearly proven. The authors likewise state that the feasibility of this work in office or out-patient is demonstrated. As for symptoms discussed, they are pain in the region of the bladder, frequency and burning of micturition, sense of residual urine, retention of urine, and incontinence of urine.

John J. Gilbert, MD talks about the treatment of ear infections in contagious diseases. He begins by stating: "All members of the profession, and particularly those interested in otology, are aware of the incidence of middle ear infection in the course of the acute infectious diseases of childhood. In the long discharging ears of adults, a careful history shows, in most cases, that the original ear infection began during on of the exanthemata of childhood. In many cases, the ear discharged continuously; some have discharged periodically; and the neglected cases show extensive destruction of drum membrane and ossicles. When polypi and cholesteatome are present in addition, the ear becomes a very dangerous one, and besides the loss of hearing that results, a radical mastoid with its dangers, difficulties, and disadvantages, is necessary often to save life."

## **FIFTY YEARS AGO, JUNE, 1962**

In "The Doctor's Image — Past, Present, and Future" by Samuel Adelson, MD, the image of "The Doctor"—a popular calendar illustration by Sir Luke Fildes—is summoned. "Whatever the outcome, the doctor is still their trusted friend. They consult him on all matters—not only health. They seek his advice concerning business ventures, children's education, marriage, and all other intimate matters." How has that image changed? That is Adelson's question. Medications are different, as are procedures. Likewise, mortality rates since the time of the classic image have plummeted. Has the doctor's image risen even further to reflect this?

Glidden Brooks, MD, looks at medical education and Brown University. One hundred and fifty years previous when the Rhode Island Medical Society was chartered, there were students pursuing studies at the infant medical school established only a year before at Brown. Brooks looks at the history of medical education at Brown, acknowledging the already detailed work

on the subject by the current journal editor Seebert Goldowsky, MD, and offers up a few additional significant features.

Jay Orson, MD, presents a case study under his article "Transient Dysproteinemia in Infants." A term first used in 1956, it is described as a syndrome in infants consisting of edema, pallor, and marked irritability due to hypoproteinemia of unknown etiology. There have been several reported cases of this condition in children and infants, and rather extensive studies of what appeared to be a similar but more serious condition in adults.

## **TWENTY-FIVE YEARS AGO, JUNE, 1987**

In an editorial regarding the benefits and risks of physical exercise, a shift in exercise is noted—partly moving from an observed activity to one with greater participation. Decades previous, only young or middle-aged males regularly participated. Now the majority of the population engages in some form of exercise. A jogging grandmother is no longer an object of astonishment. In 1961, 24% of adults regularly exercised. By 1984 the number had risen to 59%. In 1985, over 100,000 Americans had registered for organized marathons. While the benefits of exercise are obvious, risks should be noted as well. A casual review of professional journals yield a list of problems arising during recreational physical activity including hypoglycemia and exaggerated rise in plasma epinephrine, a rise in creatine kinase MB isoenzyme serum concentrations in swimmers, elevation in the blood levels of beta-endorphin and norepinephrine in marathon runners, nephroptosis and radial nerve palsy in joggers, ulnar nerve palsy (and road accidents) in bicyclists, and cases of sciatica among unicyclists.

Edward Akelman, MD, provides an overview in upper extremity injuries in athletes and how the proper treatment of injuries depend upon careful evaluations. The rise of increased interest in the topic coincides with the rise in sports activity among the populace. Dr. Akelman's article focuses on common injuries in each area of the fingers and thumb, the hand, the wrist, and the elbow. Prompt recognition and specific diagnosis allows for a specific treatment and rehabilitation plan. Treatments should be individualized, with an ultimate goal to return the athlete to his or her previous level of competition.

Continuing the theme of sports injuries, Ira J. Singer, MD, looks at sports related knee injuries in the pediatric and adolescent athletes. Noting that significant increase in injuries in juvenile athletes participating in organized sports is not surprising, in some areas, there has been a tenfold increase in the number of these injuries in just the past decade. Adequate understanding of the anatomic nature of sports injuries and their etiologies can aid the physician involved with the care of adolescent athletes. Injury prevention by appropriate conditioning and competition levels along with quality coaching and supervision should reduce the frequency and severity of injuries to the child athlete.

# Rhode Island Medical Society Bicentennial Observances in 2012



## **Bicentennial Gala at Newport's Rosecliff Mansion, Saturday evening, April 21, 2012**

A festive black tie (optional) evening of dinner and dancing will commemorate the Rhode Island Medical Society's founding, which took place at the Old State House in Providence on April 22, 1812.

## **Dr. Amos Throop portrait, ca. 1795, by Ralph Earl**

Having spent most of 2011 at the Williamstown Art Conservation Institute, RIMS' luminous portrait of its first president, Dr. Amos Throop (1736-1814), by the noted American portraitist Ralph Earl, (who painted leading figures on both sides of the Atlantic, including King George III), is now in optimal condition for its return to Providence and its first public display.

## **Publication of *Medical Odysseys***

Join us on December 15, 2011 at the Hay Library to meet the authors and get your copy of RIMS' recently published collection of historical essays and commentaries by Dr. Stanley Aronson, Dr. Joseph Friedman, and editor Mary Korr. Contributions benefit RIMS' Bicentennial Observances.

## **Public Symposium on Neurobiology and Society**

In the fall of 2012, in cooperation with the Brown Institute for Brain Sciences and the Warren Alpert School of Medicine at Brown University, the Medical Society will co-sponsor a series of public lectures on the broad ramifications of recent advances in neuroscience.

## **Inaugural presentation of the RIMS Dr. Amos Throop Prize, May 26, 2012**

The Medical Society will endow a new prize to be presented annually to graduating seniors at the Warren Alpert School of Medicine at Brown University who have demonstrated interest, aptitude and engagement in public policy relating to health care and in the role of organized medicine in advocating for patients. The prize will be named for the Society's first president, Dr. Amos Throop, a Revolutionary War veteran and a Federalist who served three terms in the General Assembly.

## **Naval War College Museum: New England Lobster Bake**

The NORCAL Mutual Insurance Company plans to host a summer outing for Rhode Island Medical Society members on the scenic grounds of the War College Museum on Coaster's Harbor Island in Newport.

## **Exhibit of 16<sup>th</sup> and 17<sup>th</sup> century medical books and instruments from the RIMS collection at Hay Library**

The Rhode Island Medical Society donated its fifty-five thousand volume collection of books and antique medical instruments to Brown University in 1987. A commemorative exhibit is planned in 2012.

## **New History of RIMS**

A new history of the Rhode Island Medical Society is under the pen of the current executive director of the Society. The last comprehensive history of RIMS was published in 1966.

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