A generation ago a woman’s role in medicine was that of a patient, and the thought of devoting an entire issue to the subject of gender was unheard of. But much has changed since 1970, when only 8% of practicing physicians and 13% of medical students were women. In the past 30 years, the white coat has opened to increasing numbers of women interested in pursuing a career in medicine.

By the year 2010, nearly one third of practicing physicians will be women. What does that mean for health care? Will the “feminization” of medicine change its practice in the next century? To begin to answer that question, Assistant Surgeon General Susan J. Blumenthal, MD, MPA, delineates the issues and challenges that will confront health care in general, and women’s health in specific, in the new millennium. To understand the historical role of women in medicine, Rhoda Wynn traces their therapeutic image and lineage from ancient times to the present.

Today, while 84% of female physicians are generally satisfied with their careers in medicine, almost one third of them would not pursue a medical career if again given the choice. Medicine demands a unique compromise between personal and professional life, but the intensity of job stressors does not appear to vary significantly along gender lines, and the conflicts that may ensue from being both a physician and a parent appear to be less a cause of job dissatisfaction than are workplace issues—the opportunity for advancement, practice control, and harassment. In an interview with 3 female surgeons, Valerie A. Jones takes a magnifying lens to their lives, both inside and outside the operating room.

As women have begun to practice medicine across all specialties, making inroads in organized medicine and academia, the number of female full professors is growing at a rate faster than that of men. Yet women are still underrepresented in leadership positions. Even if the rate of women attaining full professor rank continues to grow yearly as it has during the past 7 years, at least 25 years remain until the proportion of women at full professor rank is half that of men, despite near gender equity when entering medical school. Janet Bickel and Valarie Clark address one remedy to the lagging advancement of women in academic medicine: better mentoring.

Finally, this month’s MSJAMA online includes a bibliography from the Women Physicians’ Health Study (WPHS). The WPHS undertakes the challenge of describing who women physicians are and what they believe—assessing such differences as race, religion, specialty choice, career satisfaction, and health risks. Data from the WPHS remind us that the generalization “women in medicine” is a rhetorical device, and that female physicians are just as different as they are similar.

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Critical Women's Health Issues in the 21st Century

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WHEN MY MOTHER WAS DIAGNOSED WITH CANCER, MORE THAN 30 years ago, we could not say the word cancer out loud nor share her struggle with others. The only people specializing in women's health were obstetricians and gynecologists; no government offices and few resources were devoted to women's health. Less than 10% of entering medical students were women and there was a shortage of female leadership in the health professions. Professional education used the 180-pound male as the generic patient, and much research was conducted with men only. The results were then generalized to guide the treatment and prevention of disease in women.

Thankfully, much has changed. Since 1900, public health interventions have resulted in a 30-year increase in women's life expectancy. But this good news is tempered by the fact that while women are living longer, they have poorer health outcomes and suffer more chronic disability than do men. Today, more than 46% of entering medical students are women. And although there is still a dearth of women at the top of academic medicine, the emergence of women in leadership positions has helped bring women's health to the forefront of our health care agenda.

In recent years, the federal government has significantly increased funding for a broad spectrum of research and innovative programs on women's health, and a focus on these issues has been woven into all federal health agencies. The National Institutes of Health now requires women and minorities to be included in the research it supports, and the Food and Drug Administration encourages that women be included in drug and device testing. Regional women's health coordinators have been appointed to focus on inclusion at state and local levels. The National Women's Health Resource Center has been established, which provides easy access to women's health information by telephone and on the Internet.

Gaps in knowledge are being filled through the support of research on women's health across the lifespan and by examining gender differences in health and disease. Thus far, 18 National Centers of Excellence in Women's Health have been established to foster research, clinical services, and education on women's health issues, as well as to enhance the career development of women in academic medicine. Recommendations for medical education curricula have been disseminated to help ensure that future physicians are sensitive to gender differences in the etiology, treatment, and prevention of disease.

In the 21st century, improving women's health means addressing the social, biomedical, and environmental issues that will shape the health landscape of the future. Women now represent 60% of those over age 65 and 71% over age 85. By 2030, 20% of women will be over age 65, and as we age, the number of people with chronic conditions will increase. Therefore, priority must be given to improving health care research, services, and prevention programs for older women. Racial and ethnic disparities in health care must also be addressed.

Advances in medical research have largely eliminated some of the diseases that killed people at the beginning of the 20th century. The human genome will likely be mapped within the next 5 years, promising new treatment and prevention strategies; technology is revolutionizing our world and the practice of medicine. But as advances in medical diagnosis and treatment are developed, they need to be designed and evaluated with women in mind, and we must address the accompanying ethical and legal issues.

A top priority in the 21st century must be the prevention of disease and ensuring that national efforts target the unique needs of women. Prevention means developing new strategies to eliminate environmental hazards from women's lives. It also means safeguarding our nation's future by ensuring that every child has a healthy start and is protected from violence, tobacco, and drugs.

In the new century, we must work to provide access to health care for all Americans, and we must destigmatize mental illnesses. We must also adopt a global perspective on women's health. The spread of infectious diseases, tobacco and guns, the threat of bioterrorism, food and water supply safety, and violence against women do not recognize national borders. Finally, we must strive for economic and educational equity for all women, since socioeconomic status is one of the most powerful predictors of health.

Marie Curie, who was never admitted to the all-male French Academy of Sciences, even after winning a second Nobel prize, once said, "I never see what has been done. I only see what remains to be done." Clearly, much progress has been made, yet much more must be accomplished if equity for women's health is to be achieved in the 21st century.

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THE HERITAGE OF WOMEN IN MEDICINE SPANS ANCIENT history to the present, with female practitioners weathering fluctuations in status influenced by the religious, social, and scientific milieu in which they lived.

Ancient Goddesses and Healers
Female practitioners of the medical arts were active in the ancient world. Worship of Isis, the great goddess of medicine, was universal among ancient Egyptians; magnificent temples were built in her honor and priestesses of Isis were regarded as physician-healers who obtained their healing powers from the goddess. At Sais, a city at the mouth of the Nile, women were both students and teachers at a women’s school specializing in child-bearing issues. Egyptian records also show that women studied at the royal medical school at Heliopolis as early as 1500 BC. Illustrations of women performing surgery were common on tombs and temples throughout Egypt, suggesting that female physicians were widely accepted by the general population.

In ancient Greece, the goddesses Athena, who cured blindness; Hera, the chief healing deity; and Leto, the surgeon, were worshiped for their healing skills. Hygeia and Panacea, like their father Aesculapius, were “sainted mortals” who probably also had been independently practicing physicians. Statues of Hygeia and Panacea were located in over 300 healing temples throughout Greece, where oracles were interpreted by male and female priests who prescribed treatments to their patients.

Subsequent Greek women doctors taught medicine, took care of patients, performed operations, and provided obstetrical care. Galen, the renowned physician, recorded the activities of several women physicians, including Margereta, who held a prestigious position as an army surgeon, and Origenia, whose remedies for hemoptysis and diarrhea he praised. The skills of Greek medical women were highly sought after, and they commanded high prices in the Roman slave markets as captives after the fall of Corinth. Female physicians in ancient Rome, called medicae, managed busy practices and were on equal footing with male physicians.

Of Saints and Witches
Art, literature, and medical science declined as the Roman Empire disintegrated under the pressure of the invading barbarian tribes. The practice of healing fell to women at home and within the holy orders. A few holy women were canonized for their work. St Bridget practiced medicine and midwifery in Ireland and St Scholastica aided her brother St Benedict during the plague. As the medieval period progressed, the education of women in medicine suffered a decline as the early church stressed the inferiority of women.

In contrast, the school of medicine at Salerno, Italy, accepted women. The climate of tolerance in this city allowed influences from Arab, Jewish, Roman, and Greek cultures to coalesce in intellectual achievements that included medical concepts to which women contributed. The best known woman on the faculty was Trotula, a magistra medicina, who wrote a book on obstetrics and gynecology that was used for more than 400 years.

Witch-hunting swept through much of Europe as the Middle Ages waned. Because women were not allowed to study medicine, skill in healing was assumed to have been obtained from the devil. Spinsters, widows, and other women who refused to conform to the expectations of their low social status, including female healers and midwives, were frequent targets of witch-hunts. Scant evidence was required to convict.

During the witch-hunts, occurring from roughly the 13th to 18th centuries, women had been edged out of the medical profession and had lost access to formal medical education. In England and France, the passage of licensure laws and the formation of guilds in the 13th century further prohibited women from the practice of medicine. Even midwifery, previously a woman’s field, was dominated by men by the 17th century. Women were excluded from practicing in a professional capacity, though they continued to practice medicine in the domestic setting as nurses and midwives, who were considered subordinate to male physicians.

Victorian debate eventually helped women enter medicine. Egalitarian views espoused by writers such as John Stuart Mill and Havelock Ellis held that no limits should be imposed on any individual’s potential. This conflicted with the prevailing “scientific” view of biological determinism that deemed women unsuitable for careers in medicine.

Early Strides in the 19th Century
The drive to reclaim a place in medicine during the 19th century began with the efforts of several enterprising women. The prevailing view was still that women were unsuited for the profession of medicine. In 1873, one Harvard Medical School professor, Edward Clark, wrote that the end result of medical education for women would be “monstrous brains and puny bodies”; another, Horatio Storer, theorized that menstruation caused “temporary insanity.”

Among the pioneers was Harriet Hunt, the first woman physician in early 19th-century America. She represented the initial group of women physicians who, like her, trained in irregular apprenticeships and were largely ignored by the...
medical establishment. Elizabeth Blackwell achieved the next milestone by gaining admission to the Geneva Medical College and becoming the first woman to receive a medical degree in the United States. Stymied in her attempts to obtain hospital privileges, she practiced out of her own home and later founded the New York Infirmary for Women and Children, the first hospital in the United States staffed by women, and offering more women the opportunity for advanced training.

Increasing numbers of women were admitted to medical schools during the mid-1800s. Financial forces aided their entry as supporters of feminism made major contributions to schools accepting women. By the late 1800s, several previously all-male schools were admitting and graduating women, and legislators allowed the charters of medical schools specifically for women. Social acceptance also grew as women physicians increased their visibility by giving lectures on topics such as hygiene.

A few women, such as Mary Putnam Jacobi, who consulted at major New York hospitals and was the first woman inducted into the New York Academy of Medicine, came to be regarded by male physicians as peers in professional accomplishment. At the end of the 19th century, more than 7000 women were practicing medicine and another 1200 were in medical school.

### Aftermath of the Flexner Report

The number of medical schools open to women sharply declined during the early 20th century, hastened by the Flexner report. Reforms were already under way when inadequate instruction was reported at many schools that coincidentally admitted the most women. While these schools sought to maintain high standards, they had limited financial resources, and many closed. Flexner himself, while stating that “privileges must be granted to women . . . on the same terms as men,” believed that the declining numbers of women was due either to their lack of desire to be physicians or lack of demand for female physicians, as opposed to diminished opportunities.

Additionally, many women’s medical colleges had merged with male medical colleges, anticipating greater equality. However, coeducational schools with higher percentages of women tended to have less prestige and they began reducing the number of women enrolled. By 1914, only 4% of medical students were women. Aside from small increases during World War I and World War II, when there were fewer men to fill medical school slots, female enrollment remained low. As recently as the late 1960s, many school administrators continued to openly state preferences for males and had internal quota systems that limited the percentage of women admitted.

### The Emergence of New Opportunities

During the 1970s, the rise of the feminist movement and affirmative action created an atmosphere more conducive to women becoming physicians. In 1960, only 5.8% of incoming medical students were female, but the proportion increased to 13.7% in 1971 following the passage of the Equal Opportunity Act. By 1990, the number of female physicians in the United States had increased 310% from the 1970 level, when women represented 1 in 5 physicians.

Despite progress, problems linger. Female physicians lag in income and are underrepresented in research and leadership positions. Concerns that women lack the physical and mental capabilities to practice medicine continue to be raised. Many women correctly perceive that department chairs consider pregnancy to be a risk when hiring a female resident. Although many physicians feel positive toward pregnant colleagues, several studies have indicated that a significant number of physicians consider working with a pregnant colleague stressful or inconvenient. Studies showing that women physicians have a higher incidence of depression and suicide compared with male physicians have been interpreted as evidence that women may not be capable of dealing with the stress of a medical career.

As we enter the third millennium, women have made spectacular advances. Women now comprise nearly half of incoming medical students and will represent a third of all practicing physicians by 2010. The roles of women in medicine have ranged from healers with skills derived from deities, to respected colleagues, to alleged witches, to intruders into the male medical establishment, to respected peers once again. Alternately aided and hindered by education and by opportunities to practice, women have persisted throughout time and shifting social, religious, and scientific ideologies to make strides in medicine.

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DR MARY ANN HOPKINS (MAH) IS AN ATTENDING GENERAL surgeon and assistant professor of surgery at New York University Medical Center. Dr Susan Pannullo (SP) is an attending neurosurgeon and attending neurologist at Staten Island University Hospital in New York. Dr Jennifer Svahn (JS) is an attending vascular surgeon at New York Hospital Medical Center of Queens.

Q: Why do you think there aren't more women surgeons?

MAH: It's probably because of the long hours and the family sacrifices that you have to make. Since it is such a male-dominated field, it's hard to say, "Well I only want to work 3 days per week or part time." It's simply the hours that are intimidating . . . to anyone, male or female. If you are planning to have a family and children, you may have to commit to a full-time nanny.

JS: First, lay people and many physicians (including surgeons) still believe that surgery is a man's field. Although I think this is changing, this perception can be discouraging and intimidating to a lot of women. Second, the lifestyle does not lend itself easily to the other things that women might want to do, such as having a family and being a wife and mother in the traditional sense. Third, there is still a sort of novelty about women surgeons. Being a "pioneer" or minority in any arena is difficult. Most of us don't have mothers, sisters, or other close female surgical role models to serve as a reference point.

Q: What do you think are the major barriers for female medical students as they consider a career in surgery?

MAH: There is a military ethic in surgery that may not be as appealing to a woman's mentality. There's a lot of yelling and humiliation that goes on with the junior residents, and you have to accept this hierarchical mentality to fit in. Things are slowly changing, but the military mentality may be off-putting to female medical students.

SP: One major barrier is a fear of not being accepted into a surgical program. This may be due to the fact that women receive fewer excellent performance ratings in surgical rotations, partly because they are not mentored or encouraged as much as they are in other specialties. In addition, there are more subtle barriers such as the physical challenge that surgery presents for women who are smaller and often less strong than men. Most surgical instruments were not designed with small operators in mind. Earlier in my career I was counseled by well-meaning male attendings not to go into neurosurgery because I was a woman. Instead, I did a full neurology residency! When I realized that I still loved neurosurgery more than anything else in medicine, I went back and did a neurosurgery residency and fellowship.

Q: Do you have any advice for female medical students who are considering a career in surgery?

MAH: If you want to do surgery, do it! Surgery is so exciting and so dynamic that the hours don't seem that bad after a while. You may not feel like getting up in the middle of the night, but once you’re at the hospital saving someone's life it's fantastic. Ironically, women surgeons are highly sought after now both by residency programs and by patients, especially those with breast disease.

SP: I think female medical students should definitely pursue careers in surgery, if that's their gut feeling about what they want to do. They should be very upfront with the people who are training them so that it's clear what their goals and plans are in regard to marriage and children. There’s a tendency to hide this information, and residency directors are legally required not to ask these sorts of questions. It's been my experience that it's better to put your cards on the table and discover at the outset whether the residency program is a good match for you.

Q: How do you feel about your career choice? Any regrets?

SP: No regrets. I feel challenged, sometimes almost unbearably so. I think it's important to stress that the career pyramid is inverted for women compared with men. Men often begin their careers relatively unencumbered, without family obligations, and so forth, and then choose to spend less time working later in life. Women, because they bear children at a younger age, receive the brunt of the family commitment early in life and often have fuller careers as they get older. As men are thinking of retirement, women's careers often are taking off.

JS: Knowing everything I do now, I might not choose a medical career. First, I feel there is a lot of public hostility toward physicians. This is difficult and disappointing to encounter when you're one of the doctors getting up at 3 in the morning to take care of people. Second, medical school loans are so large, and you don’t make a reasonable salary until after residency. Finally, I think it is important to mention the negative effect that the stress, demands, and narrow-mindedness of surgical residency faculty can have on personal relationships. It is unfortunate, but true, that several women I know (myself included) divorced during their surgical residency, and many more women surgeons I know have never married, despite wanting to. That being said, I can’t imagine doing anything else in medicine besides surgery. I love being a surgeon. Being in the operating room is a very heady and powerful experience—there are immediate results and the technical aspects of operating are challenging and unique to our profession. There is an allure to surgery that I don’t think I would get from any other field of medicine.

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For part 2 of this interview, please see MSJAMA online, http://www.msjama.org.
Encouraging the Advancement of Women

Janet Bickel, Associate Vice President of Institutional Development and Planning and Director of Women’s Programs, Association of American Medical Colleges (AAMC), Washington, DC
Valarie Clark, Associate Director, Women’s Programs/Faculty Affairs, AAMC, Washington, DC

Mentoring Is Key
Cohort studies comparing men and women faculty have found that women remain substantially less likely than men to be promoted to senior ranks, even after adjusting for a number of publications, grant support, tenure vs other academic tracks, hours worked, and specialty. One possible cause of this discrepancy is that women receive inadequate mentoring and encouragement in their career development. In part this is because women are more likely to think of relationships in terms of support and affiliation, whereas men are more accustomed to competition and hierarchy, which more accurately describe relationships in professional education and the workplace. Female medical students more than male students seek “kindness” and “approachability” in a mentor, qualities hard to find in busy faculty. Many women would prefer a woman as mentor, but the number of senior women available to mentor remains comparatively limited; only 256 full professors are women compared with 20,035 men. Compared with men, women anticipate greater risks in becoming a mentor, women have less time to mentor, and women more often believe they lack the qualifications to be a mentor.

Multiple Approaches Needed
A comprehensive approach to improve women’s advancement in academic medicine also needs to emphasize leadership skill-building opportunities and ways to improve the academic climate for women. The Association of American Medical Colleges’ (AAMC’s) Women in Medicine program works with all North American medical schools along these lines. The 515 Women Liaison Officers, representing 238 schools and 247 teaching hospitals and 30 academic societies, form a network promoting career development of women physicians and focusing attention on gender equity at all levels. The AAMC’s annual professional development seminars include workshops on financial management, negotiating skills, and conflict management.

One of the AAMC’s goals is to stimulate medical centers to conduct self-studies examining, for instance, faculty commitment to academic medicine, faculty mentoring, and skill development needs. Under the aegis of its Committee on Increasing Women’s Leadership in Academic Medicine, the AAMC annually surveys schools on the representation of women. Johns Hopkins’ Department of Medicine based a series of interventions on a self-study conducted with support from the AAMC; from 1990 through 1995, the university undertook interventions to correct gender-based obstacles reported by women faculty by improving faculty development and mentoring and releasing isolation and structural career impediments. The number of women associate professors rose from 4 to 26 in the 5-year interval under study.

Two other initiatives deserve highlighting. The Hedwig van Ameringen Executive Leadership in Academic Medicine Program for Women, sponsored by MCP—Hahnemann University, offers 35 fellows each year an in-depth curriculum to support their advancement to leadership positions within academic medicine. A high proportion of fellows are achieving promotions to important administrative positions. One of the principle goals of this program is to bring together senior ranking women faculty for mentoring, networking, and professional development, creating an extended peer network that reduces their sense of isolation.

To help advance women faculty, the US Department of Health and Human Services included leadership as a component of its selection of Centers of Excellence in Women’s Health. Eighteen medical schools have been selected, and each school has initiated strategies to support the advancement of their women faculty.

Conclusion
As medicine faces increasing challenges, it must tap into the commitment and leadership potential of all of its members as never before. Now that 46% of entering medical students are women, institutions that fail to encourage and support the advancement of women are missing out on a high proportion of available talent. Some leaders assume that because there are so many young women students and faculty, gender equity problems are solved. But it is still true that only 10.5% of women faculty are full professors compared to 31% of men. The full potential of the increasing number of women physicians will not be realized without continuing efforts to improve the environments in which they are educated and the mentoring women receive.

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