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THE CASE FOR NURSES AS KEY CONTRIBUTORS TO MARS EXPLORATION TEAMS

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A group of people who may be overlooked as valuable contributors to Mars exploration mission are nurses. It is my contention that they would be valuable members of Mars exploration teams not only to care for injured team members, but to offer assistance to others in coping with physical and mental challenges in the environment. Zubrin contends that the engineer is the most valuable member of the Mars exploration team due to the his or her ability to manage and repair equipment. Nurses can "fix" many "people problems" in non-pretentious and practical ways similar to the manner in which engineers work out problems with equipment. Nurses are broadly educated yet practically trained. They are natural multi-taskers accustomed to working long hours in stressful environments and thinking on their feet. Characteristics of nurses that would be valuable on a Mars expedition include flexibility, ability to handle many medical and psychological predicaments, good "people skills," and the capacity to improvise supplies in whatever settings they find themselves. Nurse-practitioners, who have additional education, are trained to handle basic health problems, and are used in health practices as "physician extenders." It is my contention that the human cargo going up to space is very valuable and as complex as the sophisticated equipment. Ingrained in the traditions of the nursing profession are the values of helping others and promoting well being and health. Nurses are "doers" as well as thinkers and problem solvers, and would readily pitch in with whatever other tasks need to be done. I believe that the contributions of nurses on Mars expeditions would make these people worth their weight many times over.

Nurses represent a group of people who could potentially be very useful and make low-profile yet extremely valuable contributions to Mars exploration teams. One of the revered leaders of modern nursing, the late Dr. Martha Rogers, predicted that at the turn of the century people would be living in "moon villages and space towns," and that the discipline of nursing should focus attention on how people will live in the future.[1] Unfortunately, our presence in space is not as great as Dr. Rogers envisioned it would be, and her suggestion that nurses should consider a role in space health care has not yet struck much of a cord within the mainstream of the nursing profession. While the average nurse may be too down-to-earth to think much about space, the characteristics of being sensible and realistic will help make nurses valuable additions to long term space exploration missions.

BACKGROUND ON THE NURSING PROFESSION

For those who have only passing acquaintance with nurses, I will give a little background information about the profession. Nurses are not simply a lesser educated subset of the medical profession nor are they merely health care technicians. The nursing profession has its own unique history, traditions, and educational system. While there is some overlap with medicine in terms of the goals of health and healing and treatment approaches, the nursing role is very different from that of a physician. Some aspects of this nursing role enable very valuable contributions to space expedition teams. While the expert skills and knowledge of physicians will be important for health care in space, nurses could make great contributions in their own

right that will be explained in this paper.

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Nursing has a rich and complex history dating back to the earliest records of human life. Nursing has roots that are intertwined with the development of medical knowledge but the discipline has separate shoots and branches, for example the work of the Hospitaliers, a religious order of men who provided excellent nursing care during the Crusades.[2] In terms of modern nursing, the Crimean War is often cited as a starting point, with a focus on the work or Florence Nightingale. Miss Nightingale was an educated woman from a wealthy family, but followed a calling to serve the sick, and ultimately cared for diseased and wounded soldiers during the Crimean war.[3] Nurses have contribute countless hours of service behind the scenes during all of the modern wars. They served as symbols of light and hope in miserable circumstances, while courageously and competently going about their work.[2]

Nursing traditions provide a foundation for those entering the profession. These traditions are passed on to new nurses by experienced nurses in educational programs and in the workplace. Part of the indoctrination takes place in the form of rites of passage such as “pinning” ceremonies, where nursing students hear speeches about the values of nursing and receive a pin as a symbol of their membership in the group. Nurses and nursing students who are of high caliber in terms of scholarship and service may choose to be inducted into Sigma Theta Tau, an international honor society for nurses.

The core values of honesty, integrity and service to others are parts of the nursing tradition that will serve Mars expeditions well. The American Nurses’ Association Code of Ethics[4] lists eleven responsibilities of nurses, including the duty to respect the human dignity of people and the obligation to take individual responsibility for actions. A nurse is called upon to live the value of honesty each time he or she makes a mistake and needs to call the physician and nursing supervisor to report the error. Nurses live the value of honesty when they administer medications and treatments only within ordered protocols and candidly tell patients when they do not know something.

Unethical behavior can be observed in the fictional character “Dr. Smith” on the 1960’s television series “Lost in Space.” This stowaway who claimed to be a professor, illustrated the damage that can be done to a mission when a member operates with selfish motives and does not consistently tell the truth. I am not proposing that nurses are the only people who are honest, nor can I claim that all nurses are impeccably honest. As a group however, nurses tend to have a trust-based relationship with the public.[5]

Nurses could contribute positively to a tone of good character and honest interactions on a Mars expedition. Nurses generally enter the profession to help people and are not usually motivated by fortune or fame. Issues of honesty versus fraud, and greed for profit versus the advancement of science and the human condition, will be themes that take on more and more importance as space travel becomes common place.

NURSING EDUCATION AND EXPERIENCE: SUITABLE FOR MARS SERVICE

The traditional education and experience of nurses combined with newer theoretical approaches introduced in the later part of this century, contribute to the suitability of nurses to space expeditions. I will elaborate upon these qualifications starting with the more recent developments in the science of nursing.

A cohort of notable nursing theorists was educated at the doctoral level in the 1960's with support of the Federal Nurse Scientist program of 1962. This program was intended to stimulate and develop research in nursing by providing financial resources to institutions and scholarships to nursing graduate students.[2] The theorists approached the science of nursing from different angles. Their frameworks for nursing practice are well suited to health care in space, perhaps even better than health care on earth, currently characterized by downsizing, downstaffing, and bureaucratic demands. The original group of nursing theorists, including Orem, King, Leininger, Rogers, Watson and Roy had a considerable influence on nursing education in the United States and Canada, and to some extent, abroad. The ideas and world views of these major nursing theorists have permeated nursing education from the 1970's to the present day.[6] The theories and conceptual frameworks emphasize building positive, healthy communities within a diverse and multi-cultural world.

Martha Rogers, DSc introduced a theory of "unitary human beings" in the 1960's at New York University, contending that humans are energy fields in constant interaction with the environment.[7] The late Dr. Rogers, a well read woman who studied physics and philosophy as well as nursing, encouraged nurses to stop viewing health and illness in the usual mechanistic and compartmentalized way, and to instead look at human physiological patterns such as blood pressure and activity from a broader environmental perspective. Rogers was one of the early theorists who encouraged nurses to think about their work far into the future, in an era when life in space would be a reality.[8]

Madeleine Leininger is a nurse with a doctorate in anthropology who served as Dean and Professor of Nursing at the Universities of Washington and Utah. She spearheaded a movement to make nurses more cognizant of the cultural issues that need to be considered in health care. She also conducted research on the nature of human caring across the lifespan among people of different cultures.[9] Nurses in space will be well served by sensitivity to cultural issues, as it is likely that teams will include people from diverse backgrounds. An appreciation of the many nuances of how people care for each other will be worthwhile too, in a remote environment with people living in close proximity.

Another nurse viewed as a leader in the area of human care is Dr. Jean Watson. Watson is a nurse with a background in mental health nursing and a doctorate in educational psychology. She established the Center for Human Caring at the University of Colorado.[10] Her belief is that

care is a major component of the nursing role, and that the human touch of caring takes on additional importance in a highly technological society.

Dr. Dorothea Orem, formerly of Catholic University, Washington, D.C., emphasized the role of nurses in helping people care for themselves.[11] Self-care will be imperative in the space environment, where there will not be a plethora of health professionals around, nor will there be facilities such as hospitals and doctors' offices. On NASA missions the self-care philosophy has been successfully employed, with astronauts taught first aid and other skills associated with health and hygiene in space. Orem's background in the discipline of education contributed to her focus on the teaching role of nurses, and most nursing programs include a great deal of content about instructing people in health practices. The skill of teaching people to care for themselves in various ways will be important in space, for example people will need to be taught radiation avoidance techniques, how to use maintain good hygiene practices, and how to care for injuries in field conditions.

Sister Callista Roy, with background that includes a doctorate in sociology, took principles from Harry Helson's general adaptation theory and other sources to develop a theoretical framework for nursing that emphasizes people's physical and psychological adaptive capabilities.[12] Adaptation to the new space milieu will be a key theme for health in space, and nurses educated from this perspective will have a positive rather than pathologic framework from which to view the health needs of people in the new environment.

While the nursing theorists have contributed more recent additions to nursing curricula, basic education for nurses continues to include a heavy emphasis on biomedical sciences. Many of these topics have clear implications for health care in space. For example nurses are educated in care of burns and traumatic injuries, maintaining fluid and electrolyte balance, infectious disease prevention and hygiene, dealing with aches and pains, skin and foot care, bowel and bladder issues, and the care of new mothers and infants. Nurse-practitioners have additional education and training in primary health care, including the ability to diagnose and treat many health conditions.

ADDING SPECIALIZED SKILLS FOR SPACE CONDITIONS TO A SOLID BASE

The knowledge and skills of nurses form a sound basis on which to add specific training on health needs in microgravity situations and other space health challenges. Members of the Space Nursing Society discuss applications of earthbound nursing to space settings, for example the similarity of microgravity conditions to bedrest.[13] The Space Nursing Society (SNS) is an international organization established in 1991 to promote the interest and participation of nurses in space endeavors. At a recent conference, Linda Plush, current executive director and past president of the SNS, enumerated potential areas where nurses could contribute in space settings. Examples of such areas include motion sickness and balance problems, delayed wound healing, and the treatment or prevention of exposure to toxic

chemicals or radiation.[13] Plush asserts that nurses have often been in the forefront providing health care in extreme and hostile settings, and it is only logical that they expand their practice to the space environment (personal communication, June, 1998).

Speakers at SNS conferences have put forth a variety of ideas about nursing roles in space. John C. Proctor a British nurse who works in the offshore North Sea oil platforms suggests that there are commonalties to providing health care in remote and hazardous conditions, and reminds the public that health care takes place wherever there are human beings working and living.[14] Dr. Barbara Czerwinski sees potential for nursing research in the area of facilitating hygiene practices for women in space.[15]

Nurses also receive a great deal of education and experience that contributes to positive "people skills." Nurses have background in human development and sociology. Examples of the types of situations they handle in a day's work include helping patients to set goals in rehabilitation, teaching people how to manage various health conditions, reassuring confused older adults, comforting dying patients, and handling complaints of angry patients and family members. They are frontline people who spend hours dealing with people's most intimate physical needs and raw fears and emotions every day.

Nurses' inclination toward the practical aspects of the world and many hours of experience working in patient care settings contribute to a knack for improvising various things to meet the needs of the situation. For example nurses have a long history of interest and experience in solving problems related to practical aspects of hygiene and human waste collection. Nurses have researched skin care issues and participated in inventing new products such as the Bag-bath™ (Incline Technologies, Inc.) to improve the skin care hygiene of bedridden patients. Ostomy nurses figure out unique solutions to help people go about their daily lives with as little interference as possible from their urine or stool ostomy diversion systems. Research interests and everyday practice interests are a good match with the kinds of skills that will be needed in space travel and long-term colonization of planets. In addition, nurses are accustomed to working long hours under stressful conditions.

A HEALTH CARE TEAM APPROACH - WITH A TEAM THAT MAKES THE MOST SENSE

Will any class of worker on a Mars expedition have all the answers? No. Nurses like doctors, engineers, farmers and builders, will all need to be connected to sources of information and receive specialized training for anticipated issues within the field, specific to space flight and space living conditions.

I think a most sensible use of health personnel in space involves a team approach that makes the most of the strengths of doctors and nurses, and one that is based on the premise that no one from any discipline will have all the answers. The contributions of nurses however, would be much broader than those exemplified by Nurse Chapel assisting Dr. McCoy in the Star Trek

television series. Using the military model, flight surgeons and flight nurses work together collaboratively in many situations, both in close proximity and at a distance, where consultation takes place. Nurse-practitioners, who represent nurses with additional education and training in primary health care services, could handle many routine health needs of Mars colonists. Alternatively, nurses could serve in special roles such as a leader or member of a space "fitness team." This suggestion was offered by Dr. Phillip Harris, a management and space psychologist, at the Space Nursing Society convention of 1997.[16]

Zubrin contends that doctors should *not* be involved at least in the early Mars expeditions when engineers are more crucial because of their ability to work with and repair essential equipment. [17] While I can appreciate this argument for early missions of only four people, once settlements become established, systematically attending to the health needs of the people living for lengthy periods on the planet makes sense. Eventually, inhabitants will need assistance with aspects of life such as maintaining long term musculo-skeletal health, treating accidental injuries and giving birth. Harris suggests a significant role for nurses in the care of childbearing families and their children in space. Due to technological restrictions of the early missions, doing without a health care provider may be necessary.[16] But, once larger groups are present in space, attending to human health aspects en route and on the planet will be a prudent investment in the precious human cargo.

One of my major contentions is that a new class of health care workers or technicians is not needed as a substitute for nursing in space. There is no need to "reinvent the wheel" when the discipline of nursing has such a solid base on which to build the extra new components that are specific to health care in space.

CROSS-TRAINING SCIENTISTS TO DO HEALTH CARE - NOT THE ONLY SOLUTION

Zubrin suggests cross-training science mission personnel in basic medical skills.[17] Although this solution may work to a degree, the assumption that scientists and engineers can be cross trained to do all other essential functions on a mission has its drawbacks. I would like to point out that one of the great strengths of nurses is their ability to be compassionate and understanding when dealing with human beings at vulnerable times in their lives. Highly educated people who chose a career as a scientist to study the mysteries of Martian geology may not have the same inclination nor the sensitivity needed to deal with other people's urinary tract infections, anxieties and fears. To maximize efficiency and serve the crew better, it might be a better idea to cross train some nurses to work in the greenhouses or maintaining the life support and waste recycler systems. On the face, routine "medical technician" work may seem easy to teach and learn. However, truly caring for people's health is not quite so simple an operation. Someone who is doing it as a secondary line of work may not have the degree of investment in the results nor the skill to figure out what to do when things "don't go by the book."

Zubrin points out that astronauts are not thrilled with space doctors poking and prodding them with medical instruments while they are trying to accomplish their work, and noted the observation of the great Polar explorer Roald Amundsen that doctors were bad for morale.[17] This argument, that doctors would be narrowly focused on obtaining research data and that their continuous pessimistic proclamations might not be helpful to morale has some merit. On the other hand, dealing with those issues does not require the total elimination of doctors, nurses or other dedicated medical personnel from space missions.

By raising the point, Zubrin challenges those in health care professions to propose a model for health care in space that meets the evolving needs of the participants. In the early missions of the NASA space program, it is understandable that astronauts were called upon to participate in medical research, yet continuous participation in research involves stress. There are ways to handle human subjects research issues in space travel, such as intermittent or selective participation in research. Eventually, as more and more people travel in space, there will be less need for basic research and more of a need for health care providers to handle day to day accidents and illnesses along with safety and preventive measures.

Returning to Zubrin's reference to the opinion of Roald Amundsen about doctors, one only needs to read the book "Scott and Amundsen" to appreciate the many things that Amundsen did right on his expedition to the South Pole in contrast with the inept leadership of Sir Robert Scott.[18] The fact that Scott had doctors around was, in all fairness, not the only problem on his Antarctic expedition. A lesson we can take from the Amundsen style is an appreciation for pragmatism. When planning for health needs in space travel and habitation, we need to look at what we want to accomplish and how can it be done efficiently and pleasantly. The people who are putting together the mission can identify the values and services they want from a health care provider or team, and then select applicants who agree to work within the mission philosophy. For example, one might seek a health service grounded in the values of human dignity and self-care whenever possible. These ideals would set the tone and boundaries for a model of health care services for the particular space mission.

WHY ARE NURSES MISSING?

Dr. Harris, in the paper he delivered at the 6th National Conference on Nursing and Space Life Sciences, questioned why nurses are not included in various space programs.[16] I can offer several possible explanations from the perspective of a common citizen who watches the news. The NASA philosophy reflects an emphasis on safety and survival of astronauts. In addition, as space programs evolved in the U.S. and Russia, biomedical research projects were added to missions. With these objectives in mind, doctors represented an obvious choice for providing health care for astronauts and for conducting biomedical research.

Politics is another factor that undoubtedly plays a role in the formulation of mission objectives and selection of personnel. The hard sciences and biomedicine are disciplines represented by relatively large amounts of power and financial resources. Their presence in space is self-

perpetuating so long as there is a critical mass of interest among the members of the various disciplines. Those disciplines have established niches within NASA, and issues tend to be framed from the perspectives of people in those disciplines. It is more difficult for new groups to "break in." As space operations expand and develop, I believe the missions will be served better by including a wider range of people in the collective endeavor, including those people who do not hold doctoral levels of education nor wield a great deal of economic or political clout.

CONCLUSION

Assuming a shifting focus toward establishing a longer term presence in space, a wider range of personnel is more desirable for many reasons. I have explained the how the qualifications, values and skills of nurses would contribute to quality of life and health of people on long-term space expeditions. I have one final reason to offer for the value of nurses to space exploration, and that is their effect on the perception of the public about space travel. With the picture of nurses on Mars, the image of everyday people going into space begins to come into focus. The nurse is more representative of the average citizen than the "rocket scientist" typically pictured by the public on space missions. There is a certain amount of awe people feel about a rocket scientist or brain surgeon, but almost everyone has a nurse as a family member or friend. With nurses in space, more people might start to think of space travel as a real project that they can support rather than a science fiction dream far off in the future.

Nurse have a heritage, a broad and useful knowledge base and qualities of character which could enable them to contribute quite positively to a Mars expedition. I encourage those who are planning the personnel needs of space expeditions to consider the many benefits of including nurses on the team.

REFERENCES

1.

Malinski, V. (1986). Further ideas from Martha Rogers. In V. M. Malinski (Ed.), *Explorations on Martha Rogers' science of unitary human beings* (pp. 9-14). Norwalk, CT: Appleton-Century-Crofts.

2.

Kalisch, P. & Kalisch, B. (1986). *The advance of American nursing*, 2nd Ed. Boston: Little Brown & Co.

3.

Pfettscher, S. A., deGraff, K. R. , Tomey, A. M., Mossman, C. L. & Slebodnik, M. (1998). Florence Nightingale. In A. M. Tomey & M. R. Alligood (Eds.) *Nursing theorists and their work* (pp. 69-85). St. Louis: Mosby.

4.

American Nurses Association (1985). *Code for nurses with interpretive statements.* (Publication No. G-156) Washington, D.C.: American Nurses Publishing.

5.

Giordano, B. P. (1997). "To be effective health care providers and patient advocates, we must keep the public's

trust." *AORN Journal*, 65(3), 14.

6.

Alligood, M. R. & Choi, E. C. (1998). Evolution of nursing theory development. In A. M. Tomey & M. R. Alligood (Eds.) *Nursing theorists and their work* (pp. 55-66). St. Louis: Mosby.

7.

Rogers, M. E. (1970). *An introduction to the theoretical basis of nursing*. Philadelphia: F. A. Davis.

8.

Rogers, M. E. (1986). Science of unitary human beings. In V. M. Malinski (Ed.), *Explorations on Martha Rogers' science of unitary human beings* (pp. 3-8). Norwalk, CT: Appleton-Century-Crofts.

9.

Leininger, M. M. (1991). *Culture, care, diversity and universality: A theory of nursing*. New York: National League for Nursing Press.

10.

Patton, T. J., Barnhart, D. A., Bennett, P. A., Porter, B. D., & Sloan, R. S. (1998). Jean Watson: Philosophy and Science of Caring. In A. M. Tomey & M. R. Alligood (Eds.) *Nursing theorists and their work* (pp. 142-156). St. Louis: Mosby.

11.

Orem, D. (1995). *Nursing concepts of practice*, 5th ed. St. Louis: Mosby.

12.

Andrews, H. A. & Roy, C. (1986). *Essentials of the Roy adaptation model*. Norwalk, CT: Appleton-Century-Crofts.

13.

Plush, L. (1997, January). "Space research links to space nursing and earthbound healthcare." *Proceedings of the Life Support and Biosphere Science Conference*, Coronado Springs, CA.

14.

Proctor, J. (1998, January). "The final frontier 'inner space': A nurse's role in distant oceanic para-medical practice, an example of environment health nursing in a hazardous remote location." Abstract of paper presented at the Life Support and Biosphere Science Conference, Coronado Springs, CA.

15.

Czerwinski, B. (1996). "Adult feminine hygiene practices." *Applied Nursing Research*, 9(3), 123-129.

16.

Harris, P. R. (1997, September). "The space nurse's role in Moon/Mars personnel deployment systems." Paper presented at the conference, "Pushing the Envelope II," sponsored by the University of Texas Medical Branch at

Galveston, The Center for Aerospace Medicine and Physiology, Houston, TX.

17.

Zubrin, R. & Wagner, R. (1996). *The Case for Mars: The plan to settle the red planet and why we must*. New York: Simon & Schuster.

18.

Huntford, R. (1979). *Scott and Amundsen*. New York: Putnam.