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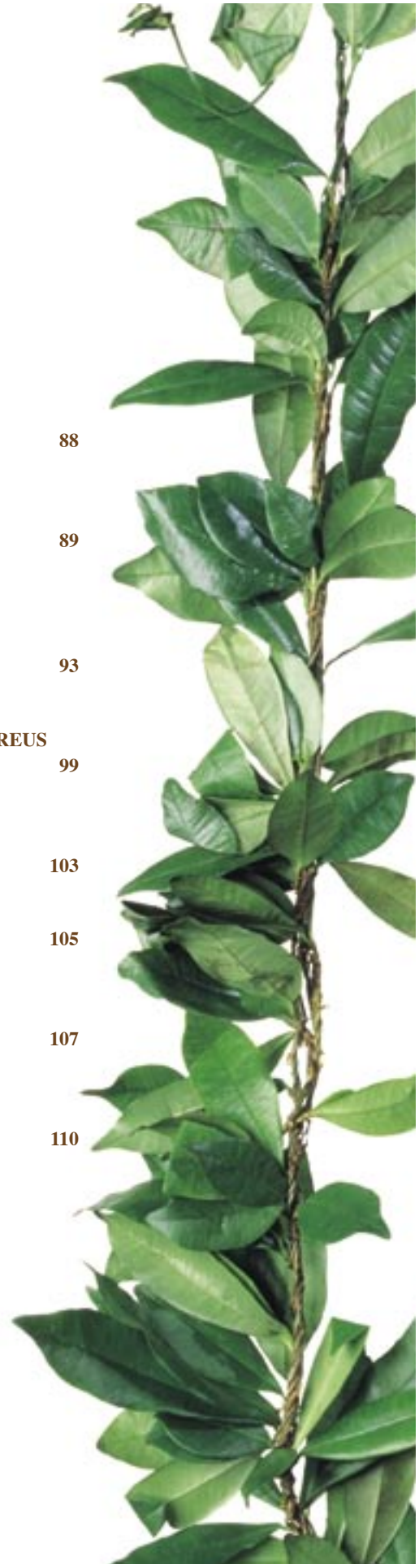

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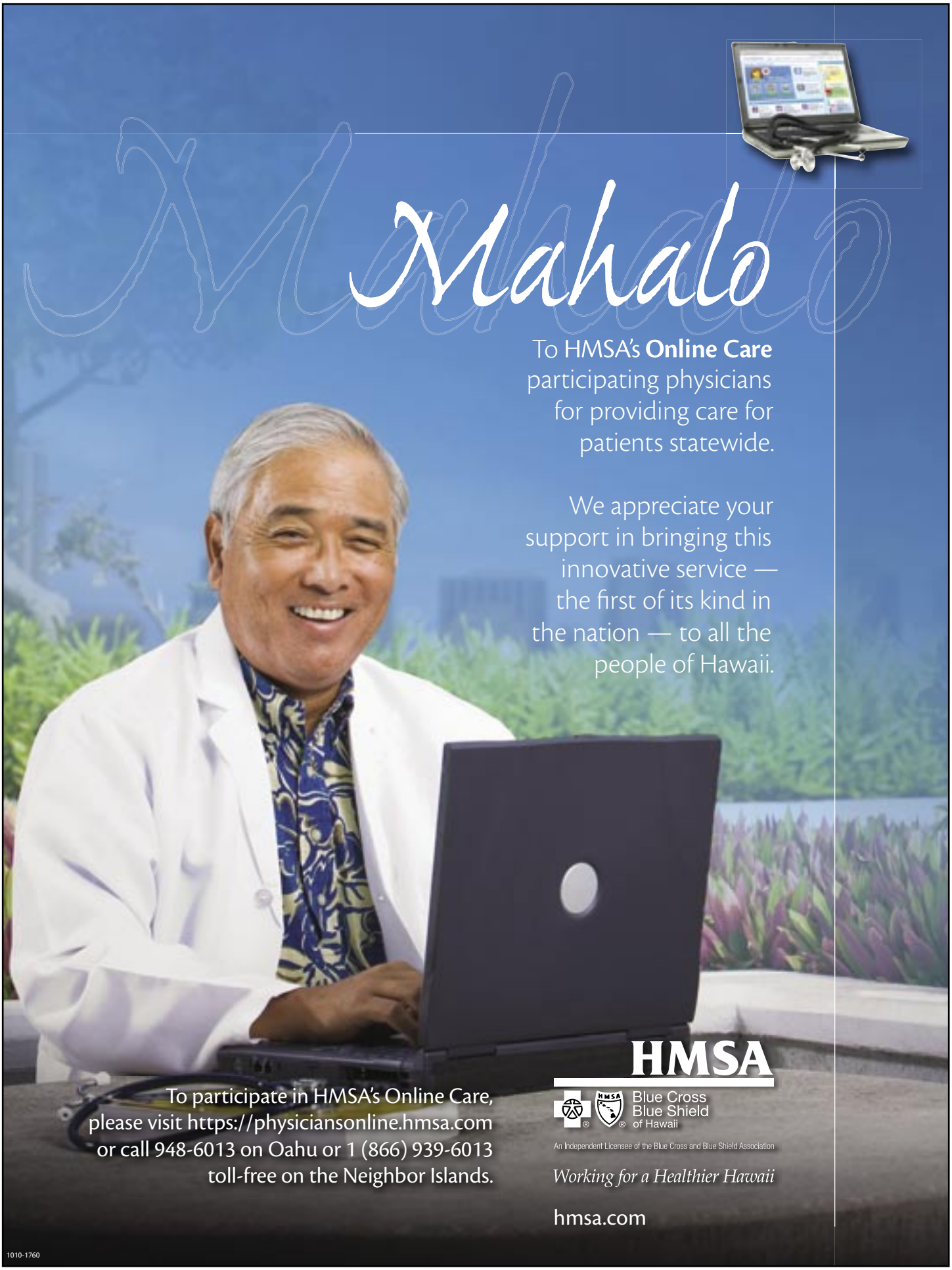
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HE MANA'O

S. KALANI BRADY MD, MPH, FACP; EDITOR, HAWAI'I MEDICAL JOURNAL

This is the 150th anniversary of laying the cornerstone of the Queen's Medical Center. Since its founding by Queen Emma and King Kamehameha IV, these sacred halls of healing at a place named *Manamana* have been committed to improving the well-being of all people in Hawai'i, and especially Native Hawaiians (as was stated in the founding mission by our Queen and King). We may know that Queen Emma canvassed door to door in Honolulu to raise funds for the building of the hospital. The Queen Emma Clinics were created to provide outpatient care for our people, and many of us learned about the practice of medicine as we trained in this setting.

The past two decades in particular have seen an increased commitment on the part of the Queen's leadership to care for the host people of these islands. Kenneth Brown, Robert Oshiro, and Gary Okimoto have provided the foundation for Art Ushijima's initiatives in the past several years. With its commitment to Native Hawaiians, Queen's reinforced the Moloka'i General Hospital in 1987, which provides the only inpatient care for 7500 residents of Moloka'i, a medical underserved island, with a population 60% Native Hawaiian. Based on a new strategic plan created earlier this decade, energy and resources have been devoted to aggressive programs to improve outcomes for cardiovascular diseases including heart disease and stroke, cancer, diabetes, obesity, pulmonary disease, and behavioral health care. Queen's has founded a new Native Hawaiian Health Program to address health disparities, such as cultural competency in health care services, a patient navigator program created in partnership with the 'Imi Hale Native Hawaiian Cancer Network of Papa Ola Lokahi, the Native Hawaiian Health Care System.

As Interim Chair for the past year of the Department of Native Hawaiian Health of the University of Hawai'i John A. Burns School of Medicine, I wish to express my immense gratitude for the generous financial support ($5.3 million) provided by the Queen's Health Systems to the medical school to establish the department. Our department has three divisions: Research and Evaluation, Medical Education, and Clinical Teaching and Patient Care Services.

Their support helped the department over the past 8 years to build a team of faculty and staff which have undertaken unprecedented research. The Research and Evaluation Division has established a Center for Native and Pacific Health Disparities Research, focusing on cardiometabolic disorders in indigenous populations with partnerships throughout Hawai'i, the Pacific, and the western region of the US Members of our faculty have become leaders in community-based participatory research (CBPR), encouraging community members to become co-investigators with JABSOM scientists. They have partnered with community people and organizations to provide health promotion programs and training statewide. They have established culturally-informed and evidence-based intervention programs such as the Mālama Pu'uwai Program (a heart failure intervention) and the PILI 'Ohana Program (an obesity intervention) to prevent and better treat cardiometabolic disorders in Native Hawaiians. They provide training in Native Hawaiian health and culturally competent research to health professionals, community workers, medical students, and undergraduate students. They engage in translational research and telemedicine throughout the neighbor islands to provide support for rural Hawai'i. Finally, they disseminate new knowledge about Native Hawaiian and Pacific Islander health to the scientific and lay community.

The department's Medical Education Division educates and prepares students from diverse backgrounds to become physicians who will work with the medically underserved and rural health communities of Hawai'i and the Pacific basin, thus addressing the physician workforce shortage. Two hundred four of the graduates from JABSOM and 31 medical students presently enrolled have been trained by our 'Imi Ho'ola post-baccalaureate program. Of these, 40% are Native Hawaiian and 70% are practicing in Hawai'i and the Pacific, with 80% in primary care. The Queen's Health Systems grant provided the stipends for the 'Imi Ho'ola students for the past 8 years. The Division has also reestablished the Native Hawaiian Center of Excellence and initiated an education program for student and faculty in culturally competent healthcare.

The Clinical Teaching and Patient Care Services Division of the department provides primary healthcare and diabetes care on O'ahu and Moloka'i through its Lau Ola Clinic, which serves a patient population of 60% Native Hawaiian, and further guides students in the provision of culturally competent care. It provides the primary healthcare for the residents of Kalaupapa on Moloka'i. And its faculty provides frequent health screening and lecture extensively in the community regarding healthy lifestyle and current recommendations for health maintenance by the nation's expert panels.

Essentially, the work of the JABSOM Department of Native Hawaiian Health was made possible by the strong commitment of the Queen's Health System to Native Hawaiians and the people of Hawai'i. We deeply appreciate Queen's vision and support! *Hau'oli lā hānau* (Happy Birthday), Queen's!

Subtropical Acarien Profile By Topography, Seasons and Change of House Furnishings: 80's Blueprint to the Future

Douglas G. Massey MD, MSc, FACP, FRCPC; Bradley E. Hope MD; and Roy T. Furumizo PhD

Abstract

Background: *In Hawai'i, mortality and morbidity from asthma are significant. In the 80's, there had been no local studies of topography folklore. There had been only one report of seasonal variation in house dust mite (HDM) density in Hawai'i, and this showed no significant variation in O'ahu's Manoa Valley, but a definite variation in Waikiki. There were no studies of complete replacement of furnishings.*

Objective: *In this pilot study, homes in a valley, coastal, and plain sites were investigated for 12 months in 2 homes on O'ahu. A 3rd home was studied prior to and after arrival of furnishings from Denver, Colorado.*

Methods: *Of the 3 homes, #1 was in Palolo Valley, Honolulu, #2 coastal at Pearl Harbor and #3 on the plain at Mililani. House dust samples were taken from 4-5 sites in 2 rooms every 5 weeks. Sampling and determination of density and species were those of Furumizo.*

Results: *They were unsupportive of the topography and seasonal variation folklore. Density surged in the 3rd home to >12000 mites/gram of dust within 10-15 weeks with the complete change of low density HDM furnishings. D. pteronyssinus (Dp) was dominant in each home year-round. Minor species of mites made up to 1/3 of total mites in 2 homes.*

Conclusion: *The folklore relating improvement in asthma to geography was not supported. 2 of the 3 homes showed minimal seasonal variation in HDM density. Local mites heavily colonized furniture from high altitude Colorado in a surge within 10-15 weeks.*

Introduction

In Hawai'i, mortality and morbidity from asthma is much higher than those in the continental US.[1] This may be due to high levels of HDM, and its major allergic component.[2] Folklore ascribes this to, among other causes, geography, seasons, and/or furnishings. An earlier study investigated HDM density over an 8 month period and showed seasonal variation in Waikiki, a coastal area, but not in the inland adjoining Manoa Valley.[3] Studies have demonstrated a significant seasonal pattern of HDM density in Ohio, Virginia, Australia, and Europe.[4-7] Minor mite species commonly occur in Hawai'i as in southern US cities, especially *Euroglyphus maynei* and *Blomia tropicalis*.[7] HDM density appears to be dependent on relative humidity (RH) and indoor temperature.[7-8]

The density of acariens in home furnishings in Denver is very low.[9]

In the 70's, host and environmental factors in acute and chronic asthma were investigated by Dr. Benjamin Gordon and Dr. Gisele Fournier-Massey, co-investigators based at the Research Unit, Kuakini Medical Center, Honolulu. Patients were recruited from door to door surveys and emergency room attendees for asthma. Short and long questionnaires were completed. Simultaneous data collection involved meteorology, air pollution, acariens, fungus and pollens. The study of evidence based etiological factors terminated in 1983.

In 1984-85, a pilot study of 3 factors drawn from local folklore: geographical difference in asthma, seasonal changes, and modification of furnishings is now reported. It guided the research of the following decades.

Methods

Sampling was done from 3 homes on O'ahu occupied by non asthmatics: home #1 in a valley in Honolulu, no air conditioning (AC); home #2 coastal near Pearl Harbor, with AC; and home #3 in Mililani in the central O'ahu plain, without AC and with furnishings that just arrived from Denver, Colorado. Samples were from the living room sofa and carpet, and from bedroom bedding and carpet. With each sampling, temperature and humidity were measured, the latter by a sling psychrometer. Rainfall data was from Federal sources.

The dust collections were performed during the months of March 1984 to March 1985 for houses #1 valley and #2 coastal, and between July, 1984 and March 1985 for home #3 central plain.

The method of Furumizo involved a house dust concentrator, collection of dust, a volumetric washing technique, and the identification and counting of acariens.[10] The house dust concentrator consisted of 4 parts: receptacle cover, sieve insert tube, receptacle tube and a rubber seal. The receptacle cover had a hole large enough to receive the vacuum crevice wand. The sieve tube consisted of a screw cap vial with its bottom replaced by a 44 mesh sieve which trapped dust and mites. The receptacle tube and rubber seal were attached to the hose assembly of a vacuum cleaner. The dust was collected from a 3x3 foot area over 3 minutes. After each sample (1 dust sample per sieve tube) was collected, the sieve insert tube was removed and placed in a 237 ml screw top jar with 40% ethyl alcohol and a coarse wire mesh. This usually occurred immediately, as the dust was not weighed. High ambient humidity in Hawai'i made it difficult to maintain the dust dry long enough to weigh it accurately.

The volumetric washing technique, which was used to quantitatively record the dust and to isolate mites from the house dust samples, involved a washing container, Buchner funnel, and compound microscope. The dust sample in the screw top jar was shaken to remove coarse dust and poured through a standard nest of 4 sieves (#9, 16, 36, and 325 mesh). The sieve insert tube, which retained the dust, was rinsed repeatedly with water and the house dust concentrator was cleaned and dried. The HD from the 4th sieve (325 mesh) was rewashed with aerated tap water to force through any of the finer dust particles and transferred to a graduated cylinder. Tapping occasionally over 24 hours produced maximum settlement and then the volume was recorded in milliliters. The sedimented dust was then transferred to the 88ml plastic screw top vial. The cylinder was washed in 40% alcohol which was added to the vial to give a total volume of approximately 75 ml. With larger amounts of dust or washing alcohol, a 118 ml plastic vial was used.

The counting of the acariens began with pipetting the contents of the vial evenly onto a filter paper in a Buchner funnel with water suction. Intact mites were individually collected by probe from the filter paper and mounted in Hoyers media. After fixation in an incubator at 30 degrees Celsius for at least 2 days, intact mites were counted and identified. Each filter paper and filter was scanned independently by one author and all by Furumizo.

Results

Using HDM density and species as markers of asthma severity, the 3 homes were compared for the effect of geography, seasonal temperature, relative humidity (RH), and rainfall (figure 1), and their furnishings of the living room and bedroom.

Mite Density

Homes: Density ranged from extremes of 1,000 to 12,000 mites/gram with minimal variation over 12 months. The largest variation occurred in home #3 from mid-August to mid-September followed by relative stability (figure 2). This surge was initiated by substituting of furnishings from high altitude.

Furnishings: For the valley home, density varied little from sofa, to carpet to bedding. In coastal home #2, density was the greatest in the bedding (figure 3). In the plain home, the peak density was greatest in the living room carpet, and remained so. The smallest increase was seen in the bedding.

Environment: Temperature correlated positively with density in homes #1 and #2. With decreased temperature, density declined earlier in the bedroom carpet then in the living room carpet, bedding and sofa (figure 4).

RH was positively correlated with increased density in home #2 ($r=0.39$, $p<0.04$). Correlation was largest between RH and density with the living room carpet, the smallest with the sofa.

Variation in monthly rainfall had a relatively small affect on density. There was an unexpected reverse correlation of rainfall and density in home #1 and a slightly positive correlation in home #2.

Species

Homes: The prevalent species was always Dp, followed by Euroglyphus sp. in home #1, Df in home #2, and Glycyphagus in home #3. Glycyphagus sp. was the next most abundant in home #1, and then Cheyletus in #2 and #3 (Table 1).

Minor species constituted 32% of HDM in home #1 and 21.5% in home #3, but only 2.5% in #2. One explanation is that home #2 had an AC and, although this did not alter the dominance of Dp, it may have resulted in a greater number of Df, which thrives in drier conditions.

Environment: In the presence of AC, Dp remained the dominant mite but Df was more common than in the other houses.

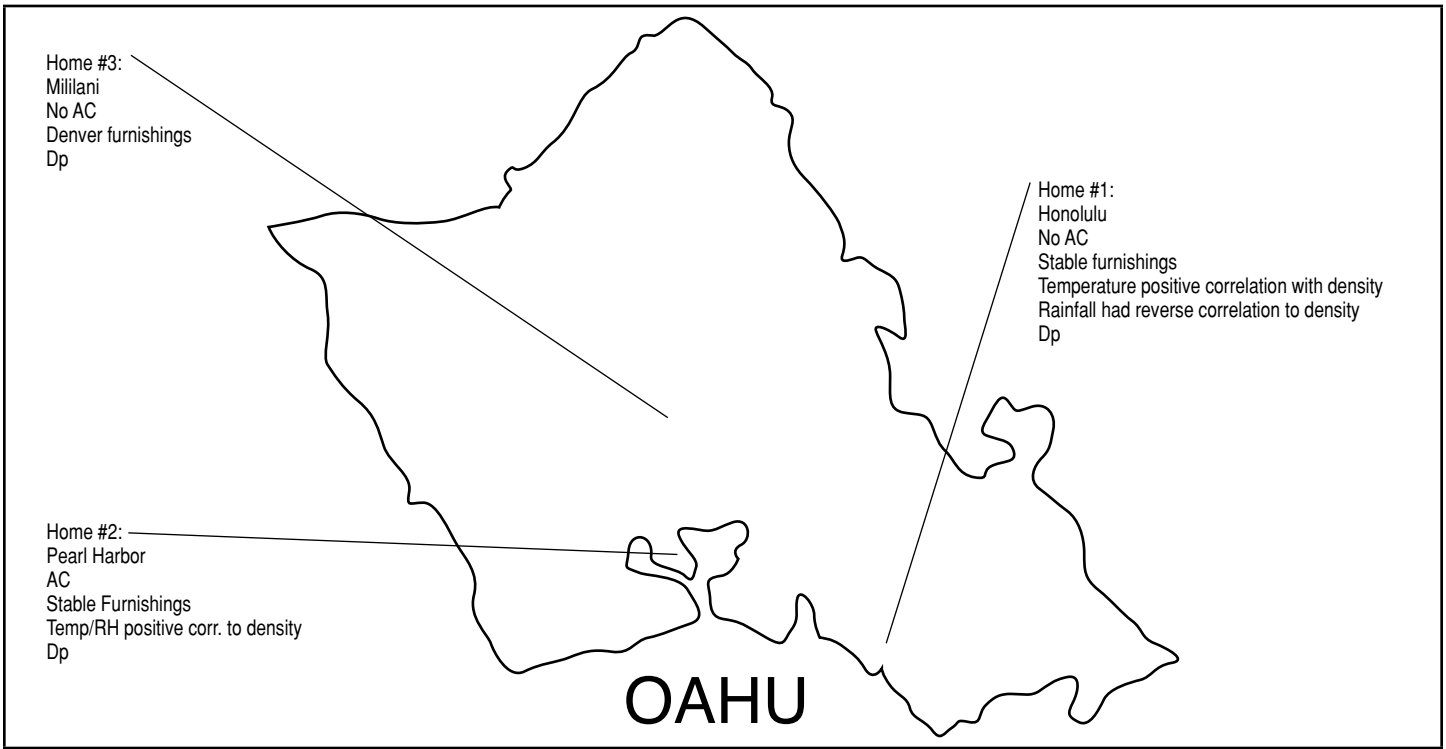

Figure 1.— Location, Environment, and Density Correlation of House Dust Mite from 3 Sampled Homes on Oʻahu, Hawaiʻi from 1984-1985.

Table 1.— Comparison of House Dust Mite Species in 3 Homes on Island of Oʻahu

HDM	Home #1	Home #2	Home #3
Dp	68.0%	92.0%	77.0%
Df	0.5%	3.7 %	1.8 %
Euroglyphus sp.	26.0%	0.3 %	0.2%
Cheyletus sp.	2.8%	3.1%	9.3 %
Glycyphagus sp.	3.2%	0.1%	12.0%

Note: rounded percentages approximate 100%

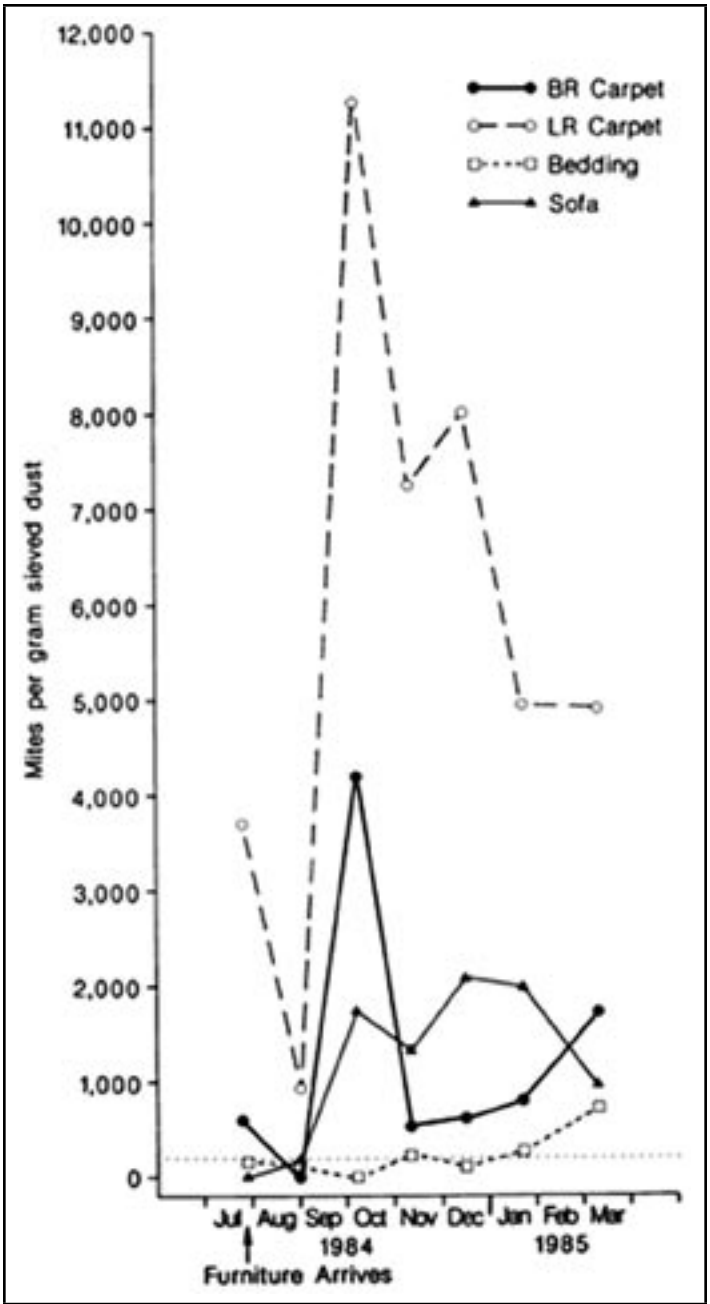

Figure 2.— Mite Density in Home #3

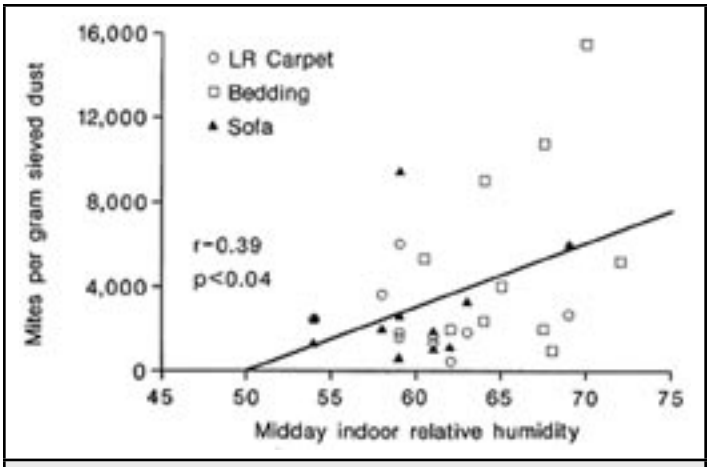

Figure 3.— Mite Density vs. Relative Humidity in Home #2

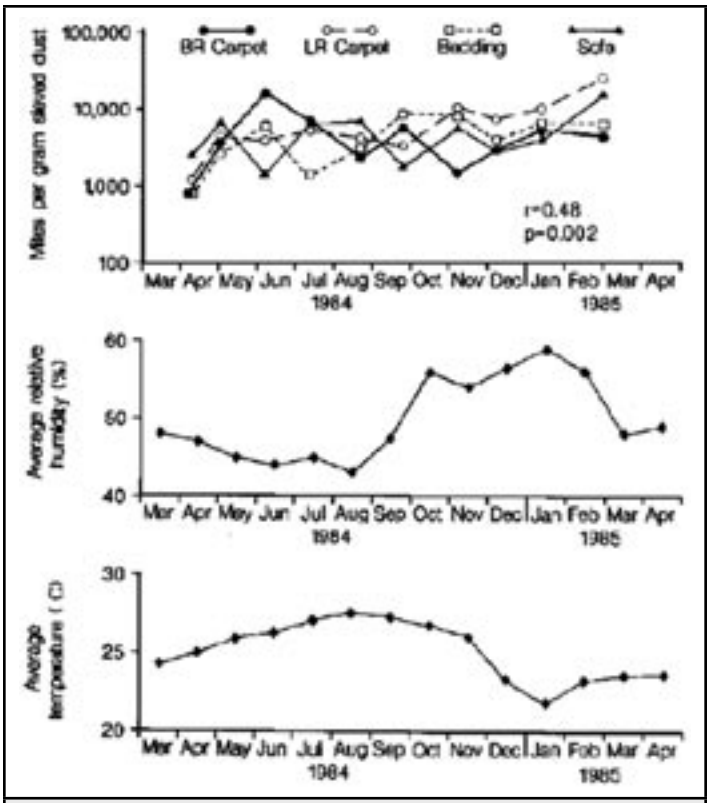

Figure 4.— Mite Density, Humidity, and Temperature in Home #1

Discussion

Within the confines of acariens as the agency causing asthma in Hawai'i, the common threads in the folklore in Hawai'i have been and still are geography, seasons, and furnishings. The first 2 appear from this pilot study to be narrative fallacies trying to make sense of a jumble of events.

Geography, except perhaps at altitude, does not seem to support the practice of seeking relief from asthma by moving to homes elsewhere whether valley, coastal, or plain.

The lack of a major role of seasonal changes in mite density and species would not likely encourage future research.

In marked contrast, the highly significant effect of replacing complete home furnishings with those from a high altitude area such as Denver showed promise.

Vacuuming is a time honored approach to management of asthma, but as noted by Massey and Massey[11], a surge in acariens can accompany it which could induce exacerbation of asthma. The remarkable surge following substitution of low density HDM furnishings in this study supports this possibility. The harmful effects of such management on the environment and patients require clinical study.

Limitations for this paper include: small sample size, Hawai'i's high humidity which did not allow dry dust weights to be measured accurately, and the 3rd house with furnishings from Denver was only studied for 8 months.

Conclusion

This investigation is an overview of some major folklore factors considered to influence asthma in Hawai'i. The authors' subsequent research through the decades has followed these findings.

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The opinions or assertions contained herein are the private views of the authors and are not to be construed as reflecting the views of the Department of the Army or the Department of Defense.

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References

1. Massey DG, Hope BE, Fournier-Massey G. Asthma in Hawaii: A tradition of excess mortality. *J Asthma.* 1997;34: 113-17.
2. Sporik R, Holgate ST, Platts-Mills TAE, Cogswell JJ. Exposure to house-dust mite antigen (Der p 1) and the development of asthma in childhood: a prospective study. *N Eng J Med.* 1990;323:502-7.
3. Sharp JL, Haramoto FH. Dermatophagoides pteronyssinus (Trouessart) and other Acarina in house dust in Hawaii. *Proc Hawaii Entomol Soc.* 1970; 20 (3):583-9.
4. Arlian LG, Bernstein IL, Gallagher JS. The prevalence of house dust mites, Dermatophagoides spp, and associated environmental conditions in home in Ohio. *J Allergy Clin Immunol.* 1982;69:527-32.
5. Platts-Mills TAE, Hayden ML, Chapman MD, Wilkins SR. Seasonal variation in dust mite and grass-pollen allergens in dust from the houses of patients with asthma. *J Allergy Clin Immunol.* 1987;79:781-91.
6. Domrow R . Seasonal varition in numbers of the house-dust mite in Brisbane. Med J Aust. 1970;2:1248-50.
7. Korsgaard J. House-dust mites and absolute indoor humidity. *Allergy.* 1983;38:85-92.
8. Arlian LG, Bernstein D, Bernstein IL, Friedman S, et al. Prevalence of dust mites in the homes of people with asthma living in eight different geographic areas of the United States. *J Allergy Clin Immunol.* 1992;90:292-300.
9. Moyer DB, Nelson HS, Arlian LG. House dust mites in Colorado. *Ann Allergy.* 1985;55:680-2.
10. Furumizo RT. Collection and isolation of mites from house dust samples. *California Vector News.* 1975;22:19-27.
11. Massey JE, Massey DG. Effect of Vacuum Cleaning on HDM. *Hawaii Med J* 1984; 43: 43-45.

Human Injury From Atomic Particles and Photon Exposure: Fears, Myths, Risks, and Mortality

Frank L. Tabrah MD

Abstract

Energy absorbtion from particles and photons moving at relativistic speeds has been a fundamental part of life on earth and wherever else life might exist. Heat and visible light have deeply influenced the course of human evolution, affecting habitat and nutrition. The photons of ionizing radiation that over time can possibly affect evolution, contribute to the more immediate problem of morbidity and mortality of cancer.

This review addresses our radiative energy absorbtion, from both natural and manmade sources, and its relationship with disease and death. Educational Public Health efforts to offset the dangers of solar ultraviolet overexposure are presented, together with data on the significant mortality of metastatic melanoma.

Ever since the generation of radio waves in a laboratory experiment by Hertz in 1888, in which he related the radio waves to light, the effects on biologic systems of the entire range of electromagnetic radiation have been of intense research interest.

In our daily activities we often forget how completely we are, even in our bodily composition, linked to cosmic energy and matter, and how our biologic future hangs on the stability of a few physical constants in our biosphere, and probably, as individuals, our lifetime atomic particle and photon exposure.

$E= Mc^{\wedge 2}$. This familiar expression has much more of a role in our lives than just the devastating reality of the atom bomb. The transfer of energy throughout the entire electromagnetic spectrum involves the interaction between the magnetic and electric fields described by Maxwell in 1873. Enormous levels of kinetic energy can be transferred through microscopic to cosmic distances by photons that travel at the speed of light, carrying a relativistic mass/energy. This energy, when photons collide with atoms and molecules of living systems can cause serious damage or death. The energy imparted to target tissues rises linearly with the radiation frequency, and the more photons that arrive per second from any source, measured as flux, the greater the potential for damage.

The radiation frequencies in all these categories of electromagnetic output range from a few thousand Hertz in the radio spectrum to $10^{\wedge 21}$ Hertz in the gamma ray spectrum.

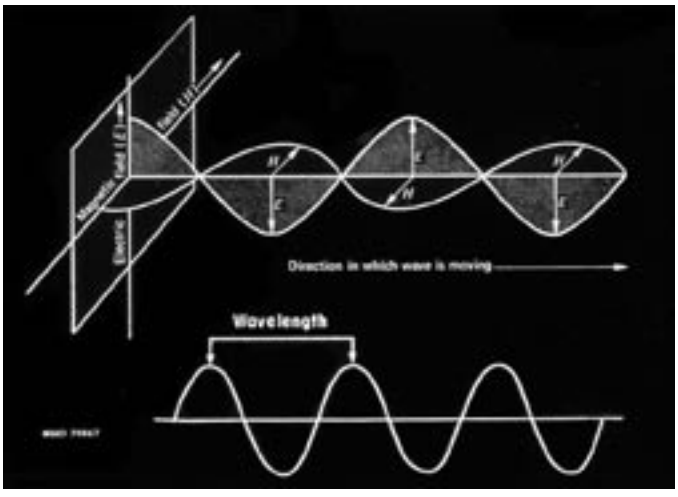

Figure 1.— Electromagnetic waves (ie. light, xray, infrared, and gamma rays. Waves consist of electrical and magnetic forces moving in consistent wave-like patterns at right angles to one another.

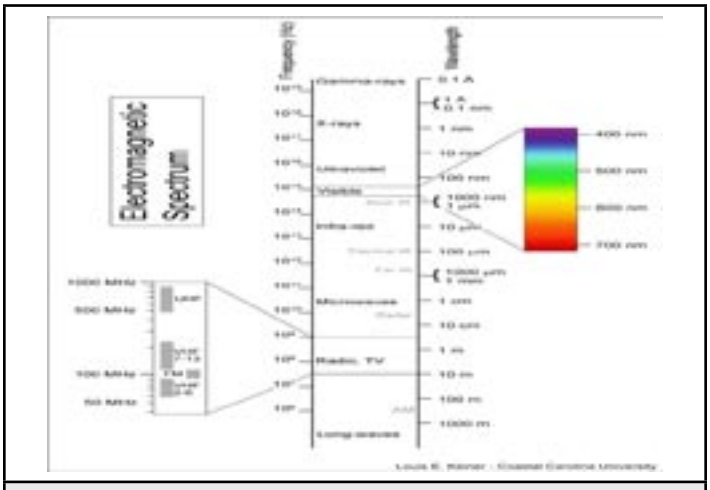

Figure 2.— This is the electromagnetic spectrum – note the narrow band of visible light.

Energies range proportionally from a harmless billionth of a volt to a trillion electron volts at the highest frequencies. At the gamma end, and through X-ray and UV above 10 electron volts, destructive ionization in cells and tissues occurs, DNA is altered or destroyed, and in the infrared and microwave range, enough heat can be generated by the movement of water molecules to fatally "cook" tissues. Most radar operates in the "X-band" (microwave radio region, 8-12 GHz). Very close exposure to radar sources can cause serious heat injury to tissues. Standards for safe human exposure will be found in the ANSI/IEEE C95.1 1991 publications.

With relatively long radio wavelengths, no significant biologic interaction is known. This is important since there has been, for years, a great furor over possible human injury from exposure to the electromagnetic fields produced by 60 Hz AC electric power distribution systems. After some forty million dollars worth of careful research at the Electric Power Research Institute in Palo Alto and many other sites, no biologic effects were found.

Photon energy is miniscule at 60 Hz, the usual power line frequency radiation with a wavelength of 3107 miles. Relatively little energy is transferred and no reaction appears to occur with the atoms and molecules of living forms. The same is true for broadcasting station, TV, and computer equipment radiation. In the seventies and eighties, the late Dr. Stanley Batkin and I studied the effects of various non-ionizing electromagnetic fields on bacteria, cell cultures, mice, and rats at the Cancer Center of Hawaii, and in 1990 and 1998, on osteoporotic- prone and arthritic patients. No ill effects were found in laboratory animals or patients from field exposures at low radio frequencies, which concurs with the valid research literature.[1,2]

Robert K. Adair, in 1998 and 1999,[3,4] held that any possible photon energy absorbed at the low frequencies and long wavelengths is far less than the mean energy from thermal agitation, *kT (where k=Boltzmann's Constant and T=temperature)*, present in living systems. Random power line frequency electromagnetic energy absorbtion at five milligauss exposure (an uncommonly high environmental level) would be roughly one ten thousandths of *kT*, producing no conceivable effect. This is only true of low frequency, long wave photons—but the story changes dramatically as the oscillation frequency rises, resulting in biologically devastating energy transfer.

In our universe, we live in an incredible soup of radiation—the electromagnetic energy engulfing us from many directions and sources at widely varying frequencies. The degree of interaction of these energy waves with life is dependent on the nature of the absorbing entity, the intensity of exposure (number of impinging photons/tissue mass), and the length of time of the exposure. Here are some examples of the photon energy range, which is remarkably wide.

Photon energy range
Gamma rays – 10^12 electron volts
Ionizing UV– 10 electron volts
Visible light – 3-4 electron volts
Cell Phone – 10^ -4 electron volts
60 Hz (power line) – 10^ -15 electron volts

Figure 3.— Some important photon energy ranges. Note the extreme difference in energy carried by gamma rays and 60 Hz power line radiation.

Now just where do all these electromagnetic waves really only light of vastly different colors and energies most of which we cannot see come from? First, earth is bathed in natural or background radiation. This arrives from cosmic sources that include the infrared radiation from the yet unexplained Big Bang, gamma, X-ray, and radio frequency radiation from distant quasars, stars and galaxies.

Figure 4.— This is M 31, a typical galaxy like ours, about 150 thousand light years in diameter, containing 100 billion stars, all radiating energy. In our galaxy, we and the sun lie close to the center. We are in one of 100 billion other galaxies within telescopic range. The active nuclei of galaxies emit prodigious amounts of radiation.

Nearer sources of background radiation include unstable elements in the earth and its atmosphere, such as uranium and radon gas. Although the total photon energies of these very high frequency sources from far and near are enormous, their biologic effect, ordinarily, is insignificant when compared with that of the sun, a close 93 million miles away. As radiation power drops with the square of the distance from the source, the great distances of cosmic sources plus atmospheric filtration insure our survival. Still, a gamma ray burst of an imploding star, supernova, or fusion of two neutron stars, at even a few thousand light years away from us could be lethal through destruction of our ozone layer.[5] Fortunately, such explosive events, known from recorded history and their clearly visible telescopic remains, are far enough away to have been harmless to us. The light from one such stellar explosion reached us on 4 July 1054. Here is today's image of that cataclysm, 6500 light years away.

Figure 5.— The Crab Nebula, today's remains of the supernova explosion that became visible on earth in 1054 A.D. It is still radiating light and powerful X-rays which reach us from 6500 light years distance.

Two such exploding stars during at least ten billion years produced all the material in our solar system, including the elements of earth,and ourselves. Our body composition, of star forged atoms, is indeed ancient, since our sun is clearly a third generation star involving billions of years of history, with our heaviest elements having been formed in the earlier stars.[6] Fortunately, we have inherited the materials, without radiation damage from these enormously distant early cosmic events. In our menu of photons that threaten us, we must include exposure to diagnostic and treatment radiation of all types, all highly energetic and able to destroy life. Although these are usually from well-designed machines or the energy release from radioactive elements, that are well understood and controlled, cumulative doses can be carcinogenic, the result of multiple diagnostic procedures done in unrelated outpatient settings.[7]

Political toying with radioactive bombs may well constitute our greatest risk of widespread extinction. Tailored nuclear reactions now include enhanced neutron sources that are highly and quickly lethal without significant blast damage. Neutrons are relatively low energy uncharged particles that deeply penetrate the body, damaging blood-forming organs. Neutron radiation is about 20 percent of the radiation received at the International Space Station.

A new photon source to which we are exposed is the ubiquitous cell phone with its roughly 900MHz, 1/2 watt output right against our skulls, raising questions about brain and parotid cancer. Several studies of cell phone use have investigated the risk of developing three types of brain tumors, namely glioma, meningioma, and acoustic neuroma. Results from the majority of these studies have found no association between hand-held cellular telephone use and the risk of brain cancer; however, some, but not all, long-term studies have suggested slightly increased risks for certain types of brain tumors. Further evaluation of long-term exposures of at least 10 years is needed.

Three other studies reported relative risk rates in phone users of 1.6, 1.2, and 4—the first study found these elevated rates in parotid tumors, the second glioma, and the third in acoustic neuroma.[8,9] The FCC has recommended that users not place phone antennas close to the head. The effectiveness of shielding is minimal.

NCI has clear recommendations for cell phone use, based on present knowledge of risk of use.[10]

From a public health standpoint, the most important electromagnetic energy ordinarily reaching us is radiation from the sun, which includes outputs from gamma rays through the entire spectrum to radio, the very longest waves.

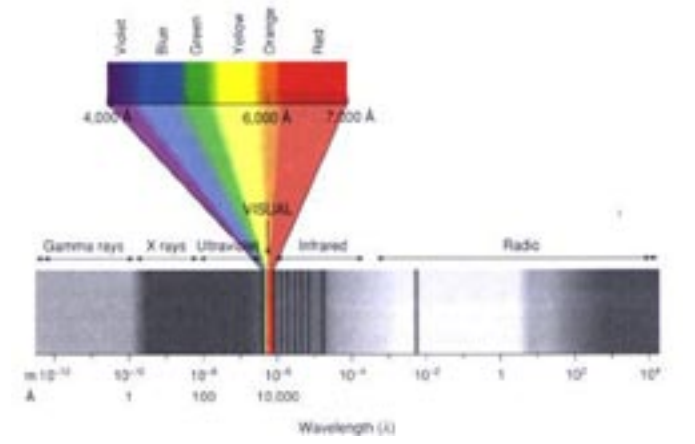

Figure 6.— The radiation output of the sun includes the entire electromagnetic spectrum.

Hydrogen atoms fusing to become Helium lose mass at 4 million tons a second, releasing photon energy primarily as gamma rays that take up to a million years to break out of the sun's surface, reaching the earth in about eight minutes as various wavelengths of light. Some of these photons reach ground level. Important biologic interactions involve heat, photosynthesis, vision, and ultraviolet effects, all of which underlie major elements of our evolution. Biologically, we are remarkably tuned to the specific outputs of the solar spectrum. Several components of sunlight are essential to us—and two are detrimental, their effects dependent on exposure (cumulative photon interaction, involving intensity and time). Two essential parts of the spectrum are the infrared that warms our entire world and ourselves, and the two ends of the visible spectrum, the red and the blue, that are critical in photosynthesis. These two narrow bands of light drive the production of almost all of our food. A critical third band is the ultraviolet with its production of Vit. D3 during skin exposure and its major role in DNA damage.

Although the sun's energy output has been fairly stable throughout earth's geologic history, the study of sunspot numbers has shown occasional correlation with wide swings in earth temperatures such as the seventy year chill during the Maunder Minimum of 1650 to 1710 that devastated agriculture in Europe.[11] Numbers of sunspots normally vary in approximately 12 year cycles, causing small changes in radiation--less than one percent. The long-term role of the Sun's energy output on earth's temperature is poorly understood.

Figure 7.—Sunspots. Sunspot cycles have correlated with solar radiation and significant swings in earth temperatures that have occurred since sunspot records have been kept, confusing the role of atmospheric gases in global warming.

In addition to the sun's fairly stable long-term photon radiation, there are occasional solar flares on the sun's surface up to 100 000 miles high that, unlike sunspots, put out enormous blasts of alpha particles, protons, neutrons and electrons.

These particles arrive much more slowly than radiation as huge clouds of material at about 300 miles a second taking 4-5 days for the storm to reach the earth. Fortunately, our earth's magnetic field deflects most of these clouds of material, but enough often gets through to completely disable electrical transmission lines and radio communication. Such storms can also injure satellites, and by their neutron content, be a major radiation danger to astronauts out in space. These winds are unpredictable, and fortunately have no effect on persons on earth. Cosmic rays are another source of

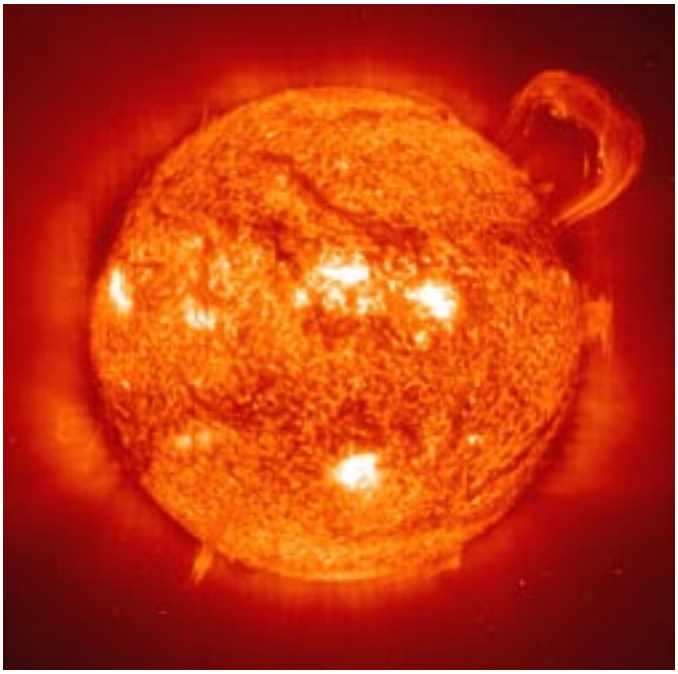

Figure 8.— Solar flare.

neutrons that comprise twenty percent of the ionizing radiation that bombards the International Space Station. Without adequate shielding, the long-term exposure of proposed interplanetary travel can be fatal.

These sporadic onslaughts of energy, dramatic as they may be, are of little importance to human health compared with the effect the ultraviolet irradiation that steadily penetrates our atmosphere, with partial but important blockage by our ozone layer.

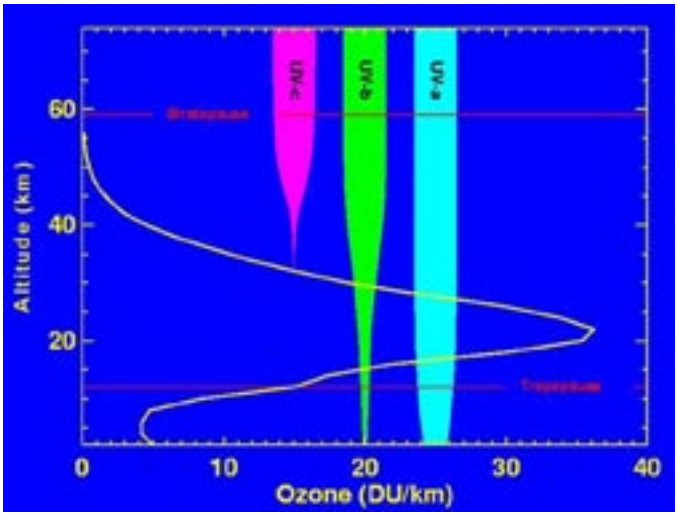

Figure 9.— This graph shows the atmospheric blockage of UV light and the heights at which it is partially blocked by ozone. Note that some UVA and UVB gets through to the surface of the earth.

Here is a diagram of the blocking of UV at various Ozone levels. UV is characterized by its wavelength as C, B, and A—two of these, A and B, are most important. C barely reaches us because of atmospheric blockage. B gets through, and is our main concern. Some B exposure is essential for production of vitamin D3, unless it is provided in the diet. Ultraviolet A, although less energetic than B, is significant in producing solar damage to collagen in the skin. For all these wavelengths taken together, for one who is not tanned one MED (minimum erythemal dose) equals roughly ten minutes of bright sunlight exposure.

For most of us, other than those who have unusual exposure to microwave energies, xray or radioactive materials, our greatest risk of tissue damage is to skin from sun exposure and from artificial ultraviolet light sources such as tanning lamps. There is a large literature explaining the biologic lesions induced by UVA and UVB, primarily DNA damage. The damage is described in detail[12] and in a review article by Griffiths et al., 1998.

UVB is a complete carcinogen, absorbed by DNA, causing damage by formation of cyclobutane pyrimidine dimers. If repair mechanisms fail, mutations occur and persist through further cell divisions. UVB can also induce the formation of singlet oxygen species that can cause DNA damage. UVA causes damage indirectly by causing the formation of reactive oxygen in other cellular structures, leading to delayed mutations with p53 protein changes. In addition, UV is known to fuse the thymine molecules in DNA, disabling its repair functions.

UV also damages collagen that leads to the thinning and destructive changes that often occur in aging- thinning of the skin and capillary fragility. Although lifelong protection from sun damage to the skin by the use of protective clothing, shelter, and sunscreens may reduce the incidence of skin cancer, lifestyle, fashion, and the popularity of tanning surely offset cancer prevention efforts.

Excess sunlight exposure is thought to be one cause of a million new cases a year of basal and squamous cell malignancy, and over sixty thousand cases of melanoma that causes 75% of all skin cancer deaths. The incidence of malignant melanoma in the United States has more than doubled between 1973 and 2004 (5.5/100,000 to 13.9/100,000) (Ref. 13), varying inversely with latitude and skin pigmentation.

Limiting exposure to lifelong repeated erythema-producing doses of UV may reduce the incidence of skin cancer. Although education of health workers and particularly the public about exposure risks may change attitudes toward sun exposure, social and cosmetic norms are likely to minimize any significant behavioral changes affecting morbidity. Despite this, and with some hope of success, CDC has attacked the problem of chronic overexposure with the following:

CDC's National Leadership Efforts

CDC's skin cancer prevention and education efforts are designed to reduce illness and death, and help achieve the Healthy People 2010 skin cancer prevention goal: Increase to at least 75% the proportion of adults who regularly use at least one sun protection option, limit sun exposure, and use sunscreen. To help achieve this goal, CDC supports the following activities to prevent skin cancer:

Collecting and Applying Vital Information — CDC develops epidemiological research and monitoring systems to determine national trends in sun protection behaviors and attitudes about sun exposure. Findings are used to better target and evaluate skin cancer

prevention efforts. CDC and other federal agencies are also helping the independent Task Force on Community Preventive Services review studies of population-based interventions to prevent skin cancer. Recommended interventions will be published in the *Guide to Community Preventive Services*. This guide will help communities make better use of available scientific information as they plan and implement interventions to prevent skin cancer.

CDC's Guidelines for School Programs to Prevent Skin Cancer — released April 26, 2002, in the *Morbidity & Mortality Weekly Report*. Overall, the guidelines emphasize the following:

1. Skin cancer is the most common type of cancer, and new cases and deaths from its deadliest form have been increasing dramatically;

2. Exposure to the sun during childhood and adolescence typically plays a critical role in developing skin cancer;

3. To be most effective and efficient, school-based approaches to skin cancer prevention should be implemented as part of a coordinated school health program because no single strategy in isolation can solve the problem;

4. Schools can do a variety of things to prevent skin cancer such as creating supportive, caring environments that make skin cancer prevention a priority.

CDC urges teens and young adults to play it safe when outdoors and protect their skin from the sun's harmful UV rays. — Campaign messages are delivered through upbeat radio and television public service announcements (PSAs) that are geared to teens and young adults — two groups that spend hours in the sun and are among the least likely to protect themselves. The campaign emphasizes that young people can protect their skin while still having fun outdoors by choosing five sun protection options: Seek shade, especially during midday when UV rays are strongest and do most damage; cover up with clothing to protect exposed skin; get a hat with a wide brim to shade the face, head, ears, and neck; grab shades that wrap around and block as close to 100 percent of both UVA and UVB rays as possible; and rub on sunscreen with SPF 30 or higher, with both UVA and UVB protection.[14]

An excellent CDC summary of skin cancer will be found at http://www.cdc.gov/cancer/skin/pdf/0809_skin_fs.pdf

Conclusions

Ever since the discovery of ionizing radiation from many sources, efforts have been made to identify and measure their effects on life. As the electromagnetic spectrum was better understood to include all radiated energy from gamma to radio wavelengths, questions were raised about the threat of non-ionizing radiation that floods our communities at the common 60 Hz power line frequency. This risk appears to have been laid at rest; but on the basis of recent studies, cell phone output may be a problem. Conclusions about this await time and further data. Safety with commercial and military exposure to radar and near infrared sources lies in well-established standards of caution.

Plans for space travel must address the difficulty of shielding against exposure to extremely high-energy particles, gamma ray, and neutron exposure.

The role of UV light in the induction of skin cancer with its melanoma mortality is an important public health problem, which has triggered the appropriate attention of CDC and Australian workers. Simple efforts increasing periodic examination of the skin by primary care providers may help to reduce the metastatic melanoma death rate of about 9000 patients a year in the USA.

Postscript

Following acceptance of this paper, Michael Green CTR, of the Cancer Center of Hawai'i provided these additional data from the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) Program under contract NO 1-PC-35137, reporting melanoma incidence in Hawai'i in years 2000 through 2005, by ethnic groups and gender.

Group	Total cases	Rate
Caucasian		
M	791	69.8
F	450	41.7
Chinese		
M	3	1.2
F	6	2.0
Filipino		
M	5	0.98
F	17	2.8
Japanese		
M	33	3.7
F	22	2.0
Native Hawaiian		
M	29	6.4
F	16	2.7

Considering the similarity of skin color (pigmentation) in Caucasians and Japanese, the nearly twenty-fold disparity in melanoma rates between these two groups in Hawai'i is remarkable. Since the history of outdoor exposure without protective covering appears to be similar in each group, it is likely that additional factors may be involved.

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References

1. Tabrah FL. Bone Density Changes in Osteoporosis-prone Women Exposed to Pulsed Electromagnetic Fields (PEMFs), *Journal of Bone Miner Res,* 5(5), May 1990, p. 437-442.
2. Tabrah FL, Ross P, Hoffmeier M, Gilbert Jr F. Clinical report on long-term bone density after short-term EMF application (p 75-78) Bioelectromagnetics Published on line 6 Dec 98.
3. Adair RK. Extremely low frequency electromagnetic fields do not interact directly with DNA. *Bioelectromagnetics* 19:136-137, 1998.
4. Adair RK. The fear of Weak Electromagnetic Fields SRAM Home 1993 Vol 3. http:www.sram.org/0301/electromagnetic-fields.html
5. Thomas BC, Jackman CH, et al. Terrestrial Ozone Depletion Due to a Milky Way Gamma-Ray Burst. *The Astrophysical Journal,* 622:L153-L156, 2005 April 1.
6. http://www.nasa.gov/home/index.html
7. Fazel R, Krumholz HM, et al. Exposure to Low-Dose Ionizing Radiation from Medical Imaging Procedures *NEJM* 27 Aug 2009.
8. Schoemaker MJ, Swerdlow AJ, Ahlbom A, et al. Mobile phone use and risk of acoustic neuroma: Results of the Interphone case-control study in five North European countries. *British Journal of Cancer* 2005; 93(7):842–848.
9. Hours M, Bernard M, Montestrucq L, et al. [Cell phones and risk of brain and acoustic nerve tumours: The French INTERPHONE case-control study.] *Revue d'Epidemiologie et de Sante Publique* 2007; 55.
10. http://www.cancer.gov/cancertopics/factsheet/risk/cellphones
11. http://science.jrank.org/pages/4184/Maunder-Minimum.html
12. Griffeths HR, Mistry P, et al. Critical Reviews in Clinical Laboratory Sciences 1998, Vol. 35, No. 3, Pages 189-237.
13. http://www.cdc.gov/HealthyYouth/Skincancer/facts.htm
14. http://www.cdc.gov/chooseyourcover.
15. General reference for public health issues in lifetime ionization effect http://monographs.iarc.fr/ENG/Monographs/vol75/mono75-5.pdf

Epidemiology of Methicillin-resistant Staphylococcus aureus Among Incarcerated Population in Hawai'i, 2000-2005

Fenfang Li PhD; F. DeWolfe Miller PhD; and Paul V. Effler MD

Abstract

It is estimated in this study the proportion and incidence of MRSA among the entire state of Hawai'i inmate population over a period of six years, using a statewide, population-based antimicrobial resistance surveillance system. Trend analyses were conducted on both MRSA proportion and MRSA incidence rates including MRSA patterns of antimicrobial resistance to other antibiotics. During the period from 2000 to 2005, 521 (69%) of 753 S. aureus isolates were MRSA. A significant increase in the proportion of MRSA were identified from both jail and prison inmates (p<0.01). A significant increase in MRSA incidence was also observed among jail inmates (p=0.005) but not among prison inmates (p=0.18). A majority of non-ß-lactams, including clindamycin, tetracycline, and trimethoprim-sulfamethoxazole remained as a good choice for the treatment of MRSA infections among inmate population in Hawai'i. Active surveillance of MRSA infection in the inmate population is an important public health tool and should be continued.

Introduction

In 2002, community-acquired methicillin-resistant *Staphylococcus aureus* (CAMRSA) gained national attention after MRSA, rather than "spider bites," was identified as the actual cause of skin infections outbreaks among inmates in Los Angeles County jails.[1] Since then, increased prevalence of MRSA skin infections have been reported in correctional facilities elsewhere.[2,3]

Incarcerated persons represent a population with unique characteristics. Young age, living in crowded conditions, poor personal hygiene, and elevated rates of concomitant infections (e.g., HIV, hepatitis B or C, and tuberculosis) collectively place this population at increased risk for CAMRSA infections.[4,5] In addition, incarcerated persons may serve as potential reservoirs for resistant organisms such as CAMRSA to be transmitted back to the community. The epidemiology of MRSA within correctional facilities have important implications for the general public.[6]

Established in 2002, the State of Hawai'i Antimicrobial Resistance Project (SHARP) has reported a continuing increase of MRSA occurrence among both pediatric and adult patients in the state of Hawai'i.[7] SHARP is unique in its ability to capture nearly 100% of all specimens submitted for antimicrobial resistance testing throughout the entire state, making it one of few surveillance systems capable for making population based estimates.[8] Utilizing the SHARP, the objective of this study is to estimate the proportion and incidence of MRSA among the incarcerated population in the state of Hawai'i, including MRSA resistance patterns and trends over a 6-year study period.

Methods and Materials

Hawai'i has four community correctional centers (jails) and four correctional facilities (prisons), all managed by the state. The jails house pretrial detainees and convicted offenders who are serving sentences of one year or less. The prisons house felons with sentences greater than one year. Three of the four prisons house male inmates and the other one serves as the only women's prison in the state.[9] For the purpose of this study, inmates housed in mainland correctional facilities as well as those housed at the Federal Detention Center were excluded.

This study used antimicrobial susceptibility test (AST) results of all clinical *Staphylococcus aureus* (*S. aureus*) isolates identified from 2000 to 2005 from incarcerated patients using the SHARP surveillance system. SHARP data includes specimen source, specimen collection date, susceptibility testing methods and results (e.g., resistant or susceptible) to a panel of antibiotics. Limited patient demographic information included patient's date of birth and gender. The SHARP database covers 100% of AST for *S. aureus* from correctional facilities through one private clinical laboratory, which provides susceptibility testing services for all correctional facilities in Hawai'i. Full description of the SHARP system, AST data collection, AST methods and reporting protocol, isolate-level data, and methods for duplicate isolate removal are detailed in our previous reports.[7,8]

Susceptibility interpretations for both MRSA and methicillin-susceptible *Staphylococcus aureus* (MSSA) isolates were based on minimum inhibition concentration (MIC) breakpoints established by the National Committee for Clinical Laboratory Standards (NCCLS, currently known as the Clinical and Laboratory Standards Institute).[10] For MRSA isolates, the breakpoint was an MIC ≥ 4 ug/mL or a zone diameter ≤ 10 mm. For MSSA isolates, the breakpoint was an MIC ≤ 2 ug/ml or a zone diameter ≥ 13 mm. Susceptibility results for other antimicrobials were based also on breakpoints published by the NCCLS.

The MRSA proportion, reported as a percentage, was calculated as the total number of MRSA isolates divided by the total number of *S. aureus* isolates for each year. The proportion of MRSA isolates resistant to a specific antibiotic was calculated as the number of resistant MRSA isolates divided by the total number of MRSA isolates tested against the respective antibiotic of interest during a year. Annual incidence of MRSA infection was calculated as number of MRSA clinical isolates divided by the total inmate population at midpoint for each year. Only the first isolate per patient per year, regardless of body site, antimicrobial susceptibility profile, or other phenotypic characteristics (e.g., biotype) was included in the analysis.[7]

Chi-square test and Fisher's exact test were used to compare proportions between categorical variables. Chi-square test for linear trend analysis was conducted to examine MRSA proportion during the 6-year study period. General linear model modeling the natural logarithm of the rates was constructed to examine trend data of MRSA incidence during the 6-year study period. One-way ANOVA was used to identify difference in the mean age of inmate patients. Statistical significance was defined as $p<0.05$ and 95% confidence intervals (CI) were estimated. Data analysis was conducted using SAS statistical software (Version 9.1, SAS Institute Inc., Cary, NC).

Results

The total inmate population, including jail and prison inmates in the state facilities, varied from 3,737 to 3,962 over the six-year period of the study. Both the mean and median age of inmate patients was 38 (range: 19-81) and no significant change was detected in the mean age during the 6-year study period.

A total of 753 *S. aureus* isolates were identified from inmates during the six years, of which 521 (69%) were methicillin-resistant. Although a majority (86%) of *S. aureus* isolates was identified from male inmates, no significant difference was observed in the MRSA proportion between male (69%) and female (70%) inmates. Out of 748 isolates with identifiable specimen sources, 727(97%) were from wounds, abscess, boils, and skin and soft tissues.

A steady increase in the MRSA proportion was observed for the total inmate population during the 6-year study period, from 48% in 2000 to 74% in 2005 (p<0.0001, Figure 1). Total number of *S. aureus* isolates identified also increased dramatically during those six years. For example, the number of *S. aureus* isolates in 2005 was almost five times of the number in 2000 (Figure 1). This trend of significant increase in MRSA proportion was also found among jail inmates (from 50.0% to 75.3%; p<0.001), and similarly among prison inmates (from 46.9% to 70.5%; p=0.0549) (Table 1).

Two facilities accounted for almost three quarters of the total *S. aureus* isolates identified. They coincidently had the highest MRSA proportions, 74% and 69% respectively. The other six facilities experienced small numbers of *S. aureus* isolates, with a range from 12 to 65 of the total *S. aureus* isolates identified during the six years. Proportions of MRSA from those six facilities ranged from 58% to 68%. The single women's correctional facility had a total of 32 *S. aureus* isolates identified during the 6-study years, of which 63% were MRSA. Nevertheless, no significant difference was observed in the MRSA proportion among the six facilities (p=0.268).

As shown in Table 1, a significant increase in MRSA incidence, from 3.2/1000 in 2000 to 88.4/1000 in 2005, was observed among jail inmates (p=0.005). This is an annual average increase of 106% among the jail inmates. An increase from 7/1000 to 18.3/1000 also occurred among prison inmates during this same period but was not statistically significant (p=0.18).

MRSA isolates resistance pattern to non-β-lactam antimicrobial was similar to those of methicillin-susceptible *S. aureus* (MSSA) isolates, with the exception of erythromycin (Table 2). In general, MRSA resistance proportions to other non-β-lactam antimicrobials remained low, i.e., no resistance was found to gentamicin, rifampin, and vancomycin. The 6-year trend analysis of MRSA resistance pattern revealed a decrease in the proportion of MRSA resistant to clindamycin when comparing the first three years (2000 to 2002) to the more recent three years (2003 to 2005). In contrast, a sharp increase was found in the proportion of MRSA resistant to erythromycin (p<0.0001, table 3). No significant difference was observed against other antibiotics in the trend analysis as MRSA resistance to those agents was generally either low or non-exist.

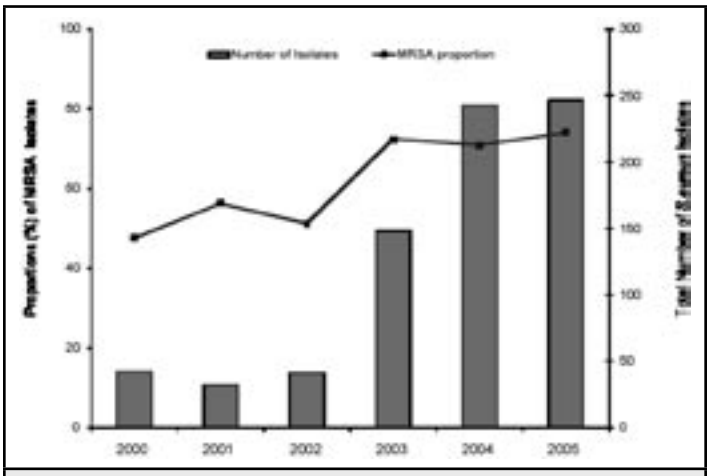

Figure 1.— Proportion of Methicillin-resistant Staphylococcus aureus (MRSA), All Correctional Institutions, Hawai'i, 2000-2005.

Discussion

MRSA prevalence and incidence among incarcerated persons have been examined in several studies in the continental USA.[3-4,11-12] Many features of the MRSA epidemiology among inmates in Hawai'i resembled patterns reported elsewhere, where a significant increase was identified in the proportion of MRSA as well as the annual incidence of MRSA infection.[3-4] MRSA proportion as high as 74% in 2005 and a significant increase in the MRSA proportion during the 6-year study period among both jail and prison inmates should signal that MRSA has become highly endemic among inmate populations in Hawai'i.

The fact that a significant increase in the MRSA proportion paralleled an increase in the total number of *S. aureus* isolates cultured each year warranted further explanation. For example, in this study, the total number of *S. aureus* cultured during the last three years (2003-2005) was nearly six times of the number of the first three years (2000 to 2002). In fact, around August 2003, Hawai'i cor-

Table 1.— Annual Incidence of MRSA Among Inmate Population in Hawai'i, 2000-2005[a]

	Jail inmates[b]				Prison inmates			
year	No. MRSA	Inmate pop.	MRSA incidence	95% C.I.	No. MRSA	Inmate pop.	MRSA incidence	95% C.I.
2000	5	1,586	3.15	0.4–5.9	15	2,151	6.97	3.4–10.5
2001	7	1,648	4.25	1.1–7.4	11	2,253	4.88	2.0–7.8
2002	15	1,436	10.45	5.2–15.7	6	2,495	2.40	0.5–4.3
2003	51	1,512	33.73	24.5–43.0	56	2,450	22.86	16.9–28.8
2004	107	1,515	70.63	57.2–84.0	65	2,362	27.52	20.8–34.2
2005	140	1,583	88.44	73.8–103.1	43	2,348	18.31	12.8–23.8

[a] MRSA: methicillin-resistant Staphylococcus aureus; pop: population; C.I.: confidence interval, calculated in the formula: incidence rate ±1.96*√ ((incidence rate/pop.)*1000);
[b] General linear model for the natural logarithm of the MRSA incidence for the 6-year study period (p=0.005);

Table 2.— Resistance Patterns of MRSA and MSSA Isolates from Incarcerated Populations, Hawai'i, 2000-2005[a]					
	MRSA isolates		MSSA isolates		
Antimicrobial drug	No. isolates tested[b]	No.(%) resistant	No. isolates tested	No.(%) resistant	p value[c]
Clindamycin	513	43 (8)	231	17 (7)	NS
Erythromycin	521	355(68)	233	69 (30)	<0.01
Gentamicin	507	0 (0)	224	0 (0)	NA
Levofloxacin	446	7(2)	175	2 (1)	NS
Rifampin	512	0 (0)	224	0 (0)	NA
Trimethoprim-sulfamethoxazole	521	3(1)	232	2 (1)	NS
Tetracycline	521	29 (6)	233	9 (4)	NS
Vancomycin	521	0 (0)	235	0 (0)	NA

[a]MRSA, methicillin-resistant Staphylococcus aureus; MSSA, methicillin-susceptible Staphylococcus aureus; NA, not applicable; NS, not significant.
[b]The number of MRSA and MSSA isolates tested against each antimicrobial drug varies as the drug panel and reporting protocol changed during the 6-year study period.
[c]By Chi -square test comparing MRSA isolates to MSSA isolates. Fisher's exact test was used for levofloxacin and trimethoprim-sulfamethoxazole.

Table 3.— 6-year Trend of Methicillin-resistant Staphylococcus aureus Resistance Pattern to Selected Antimicrobials from Correctional Institutions, Hawai'i, 2000-2005				
	Clindamycin		Erythromycin	
Year	No. tested	No. (%) resistant	No. tested	No. (%) resistant[a]
2000	20	4(20)	20	7(37)
2001	18	4(22)	18	4(22)
2002	19	5(26)	21	7(33)
2003	101	1(1)	107	63(59)
2004	172	11(6)	172	121(70)
2005	183	18(10)	183	152(83)

[a]By Mantel-Haenszel Chi-square test for trend analysis, p<0.001.

rectional facilities changed their protocol for MRSA management to culture every suspicious wound infection, including those for whom systemic antibiotics are not indicated (K. A. Bauman, M.D., personal communication, August 15, 2007). Nevertheless, our study did find an increase of MRSA incidence among both jail and prison inmates. Therefore, the increase in MRSA proportion might reflect a true increase in MRSA incidence rather than a surveillance effect due to increased awareness of CAMRSA as seen elsewhere.[1-5, 13-15]

Another interesting finding from this study was a sharp increase in the proportion of MRSA resistance to erythromycin during the last three years (2003 to 2005), when compared to the first three years (2000 to 2002). In contrast, a parallel decrease was observed in the proportion of MRSA resistant to clindamycin during the same period in spite of advocated testing for inducible clindamycin resistance through a double-disk diffusion test, in which an erythromycin disk will induce clindamycin resistance, thus exhibiting constitutive resistance.[9,16-18] Whether this finding resulted from a particular pattern of antimicrobial use in correctional institutions (e.g., a preference for macrolide to other non-β-lactam antibiotics) or relatively low rate of inducible resistance needs further investigation.[19,20] Nevertheless, this study found that a number of non-β-lactam antibiotics, including clindamycin, tetracycline, and trimethoprim-sulfamethoxazole, remained a good choice in the treatment of MRSA isolates among inmate population in Hawai'i.

Our annual MRSA incidence in both the prison and jail settings before 2003 was comparable to those from the study of MRSA infection in the Texas prison system, where an incidence of 12 per 1,000 person-years was reported.[4] However in Hawai'i, annual MRSA incidence in both settings increased sharply, particularly among jail inmates since 2003. For a dynamic population like jail inmates who are continually entering and leaving incarceration, the increased MRSA incidence may well reflect trends of CAMRSA in the community rather than the changing MRSA patterns in the jails.

One of the limitations of this study is the lack of medical records for review. We assumed that each identified clinical isolate of MRSA actually caused a clinical infection, which might not be the case as every suspicious wound infection was cultured according to the new protocol adopted in the correctional system in Hawai'i since late 2003. In addition, we were unable to examine factors associated with MRSA acquisition and transmission among this inmate population as we lacked demographic, medical, and environmental information. Future studies which combine epidemiological, medical and socio-environmental information will be able to fully describe features of MRSA infection among incarcerated populations. Such studies are needed to provide insight for understanding and preventing MRSA transmission in this group and in the community.[5,6,21,22]

Acknowledgements

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References

1. Centers for Disease Control and Prevention. Public Health Dispatch: Outbreaks of community-associated methicillin-resistant Staphylococcus aureus skin infections---Los Angeles County, California, 2002--2003. *MMWR Morb Mortal Wkly Rep* 2003; 52:110-112.
2. Centers for Disease Control and Prevention. Methicillin-resistant Staphylococcus aureus infections in correctional facilities---Georgia, California, and Texas, 2001-2003. *MMWR Morb Mortal Wkly Rep* 2003; 52(41):992-996.
3. Pan ES, Diep BA, Carleton HA, Charlebois ED, Sensabaugh GF, Haller BL, et al. Increasing prevalence of methicillin-resistant Staphylococcus aureus infection in California jails. *Clin Infect Dis* 2003; 37(10):1384-1388.
4. Baillargeon J, Kelley MF, Leach CT, Baillargeon G, Pollock BH. Methicillin-resistant Staphylococcus aureus infection in the Texas prison system. *Clin Infect Dis* 2004; 38(9):92-95.
5. Turabelidze G, Lin M, Wolkoff B, Dodson D, Gladbach S, Zhu BP. Personal hygiene and methicillin-resistant Staphylococcus aureus infection. *Emerg Infect Dis* 2006; 12(3):422-427.
6. Aiello AE, Lowy FD, Wright LN, Larson EL. Meticillin-resistant Staphylococcus aureus among US prisoners and military personnel: review and recommendations for future studies. *Lancet Infect Dis* 2006; 6(6):335-341.
7. Li F, Park SY, Ayers TL, Miller FD, MacFadden R, Effler PV, et al. Methicillin-resistant Staphylococcus aureus, Hawai'i, 2000-2002. *Emerg Infect Dis* 2005; 8:1205-1210.
8. Li F, Ayers TL, Park SY, Miller FD, MacFadden R, Effler PV, et al. Isolates removal methods and methicillin-resistant Staphylococcus aureus surveillance. *Emerg Infect Dis* 2005; 10:1552-1557.
9. Hawai'i Department Of Public Safety. 2006 Annual report. Available at http://www.Hawai'i.gov/psd/documents/reports/PSD_AnnualReport2006.pdf [Accessed in September 2007].
10. National Committee for Clinical Laboratory Standards (NCCLS). Performance standards for antimicrobial susceptibility testing; Twelfth informational supplement M100-S12. NCCLS, Wayne, PA 2002.
11. Culpepper R, Nolan R, Chapman S, Kennedy A, Currier M. Methicillin- resistant Staphylococcus aureus skin or soft tissue infections in a state prison—Mississippi, 2000. *JAMA* 2002; 287:181–182.
12. David MZ, Mennella C, Mansour M, Boyle-Vavra S, Daum RS. Predominance of methicillin-resistant Staphylococcus aureus among pathogens causing skin and soft tissue infections in a large urban jail: risk factors and recurrence rates. *J Clin Microbiol* 2008;46(10):3222-7.
13. Elston DM. Community-acquired methicillin-resistant Staphylococcus aureus. *J Am Acad Dermatol* 2007; 56(1):1-16.
14. Fleming SW, Brown LH, Tice SE. Community-acquired methicillin-resistant Staphylococcus aureus skin infections: report of a local outbreak and implications for emergency department care. *J Am Acad Nurse Pract* 2006; 18(6):297-300.
15. Fridkin SK, Hageman JC, Morrison M, Sanza LT, Como-Sabetti K, Jernigan JA, et al. Methicillin-resistant Staphylococcus aureus disease in three communities. *N Engl J Med* 2005; 352:1436-44.
16. Levin TP, Suh B, Axelrod P. Potential clindamycin resistance in clindamycin-susceptible, erythromycin-resistant Staphylococcus aureus: report of a clinical failure. Antimicrob Agents Chemother 2005; 49:1222-1224.
17. Patel M, Waites KB, Moser SA, Cloud GA, and Hoesley CJ. Prevalence of inducible clindamycin resistance among community- and hospital-associated Staphylococcus aureus isolates. *J Clin Microbiol* 2006; 44(7): 2481–2484.
18. Siberry GK, Tekle T, Carroll K. Failure of clindamycin treatment of methicillin resistant Staphylococcus aureus expressing inducible clindamycin resistance in vitro. *Clin Infect Dis* 2003; 37:1257-1260.
19. Schreckenberger PC, Ilendo E, and Ristow KL. Incidence of constitutive and inducible clindamycin resistance in Staphylococcus aureus and coagulase-negative staphylococci in a community and a tertiary care hospital. *J Clin Microbiol* 2004; 42:2777–2779.
20. Chavez-Bueno S., Bozdogan B., Katz K., et al. Inducible clindamycin resistance and molecular epidemiologic trends of pediatric community-acquired methicillin-resistant Staphylococcus aureus in Dallas, Texas. *Antimicrob Agents Chemother* 2005; 49 (6): 2283-2288.
21. Wootton SH, Arnold K, Hill HA, McAllister S, Ray M, Kuehnert MJ, et al. Intervention to reduce the incidence of methicillin-resistant Staphylococcus aureus in a correctional facility in Georgia. *Infect Control Hosp Epidemiol* 2004; 25:402-407.
22. Bick JA. Infection control in jails and prisons. *Clin Infect Dis.* 2007; 45(8):1047-55.

Laparoscopic Cholecystectomy in a Patient with a Ventriculoperitoneal Shunt

Chet W. Hammill MD; Timothy Au MS4; and Linda L. Wong MD

Abstract

With the advent of ventriculo-peritoneal shunting and improved medical therapies, patients with hydrocephalus are living longer and presenting with unrelated medical problems. It can be disconcerting to discover that the patient who needs a routine laparoscopic procedure also has a ventriculoperitoneal (VP) shunt. Although the literature is limited there is a small body of evidence indicating that it is safe to perform laparoscopic surgery on these patients with routine anesthetic monitoring. The authors report the case of a laparoscopic cholecystectomy in a patient with a VP shunt.

Case Report

A 71-year-old Japanese man with known cholelithiasis, who had been managed conservatively for several years, presented with complaints consistent with obstructive jaundice. His primary complaint was a 1-month history of postprandial nausea and emesis, initially one to two times per week, but now daily. Due to the symptoms the patient was restricting his meals to clear liquids and reported a 10-pound weight loss during this time frame. He also described intermittent fevers as high as 100.5° F, "dark" urine and pale stools. The patient's wife noted that his head and back had developed a yellow tinge in the last week.

The patient's medical history was remarkable for a hemorrhagic cerebrovascular accident (CVA) 10 years prior requiring a left frontal temporal craniotomy, gastrostomy tube placement, and VP shunt placement. Two years after the stroke the patient had an episode of abdominal pain and was found to have gallstones. Due to the CVA and his lengthy recovery the decision was made to manage the patient non-operatively. He underwent endoscopic retrograde pancreatogram (ERCP) with sphincterotomy and had been asymptomatic up until the episode described above. His only other surgical history was a distant open appendectomy. His family history included diabetes mellitus, a sister with ovarian cancer and his father, who died of a ruptured cerebral aneurysm. The patient had a 100 pack-year history of smoking but quit at the time of his stroke.

Physical exam revealed jaundice, scleral icterus, and tenderness to deep palpation in the right upper quadrant of the abdomen. His neurologic exam was unremarkable except for a previous frontal craniotomy scar and a palpable shunt in this region.

Laboratory evaluation showed the following: white blood cell count 9,400/mcL, total bilirubin 8.7 mg/dL, alkaline phosphatase 277 U/L, aspartate aminotransferase 91 U/L, alanine aminotransferase 145 U/L, cytosine arabinoside (CA) 19-9, 386 U/mL, amylase 321U/L, and lipase 1026 U/L. Abdominal sonography demonstrated cholelithiasis, gallbladder wall thickening, a common bile duct dilated to 1.2 cm, and a possible small calculus in the distal common bile duct. Computerized tomography of the abdomen also showed a dilated common bile duct, mildly dilated intrahepatic ducts, and probable stones at the distal common bile duct. ERCP revealed a mildly dilated common bile duct, but no calculi were identified. Prior to ERCP the patient's bilirubin was noted to have decreased to 2.9 mg/dL. He was treated with brief bowel rest, intravenous hydration, antibiotics for presumed cholangitis and pancreatitis.

A neurosurgeon was consulted and a shunt series was obtained. This included plain radiographs of the head, chest, and abdomen to evaluate the VP shunt tubing. The imaging demonstrated an intact left VP shunt with the tip of the catheter seen within the left mid abdomen as shown in Figure 1.

After the workup described above a laparoscopic cholecystectomy was performed in the standard fashion. The path of the VP shunt was carefully palpated, based on the plain radiographs and care was taken to avoid trocar insertion near these sites. Upon insertion of the laparoscope into the abdomen the VP shunt was noted to be in the left lower quadrant and the intraperitoneal portion appeared intact but adherent to the omentum. The patient tolerated the pneumoperitoneum and the procedure with no hemodynamic instability to suggest increased intracranial pressure. Post-operatively, the patient remained neurologically intact and was discharged home on the day after surgery.

Discussion

Ventriculoperitoneal shunts are silicone catheters placed from a lateral brain ventricle, through a subcutaneous tunnel and into the peritoneal space in order to drain excess cerebrospinal fluid in the ventricular system. They are used to treat hydrocephalus, primarily in children, due to a variety of causes but typically subarachnoid hemorrhage, meningitis or tumor. The first VP shunt procedure was performed in 1908 and since then has become a common neurosurgical procedure.[1] In 1995, an estimated 70,000 patients developed hydrocephalus in the United States and nearly 33,000 of these required VP shunting.[2] Mortality from this procedure is quite low, reported as 0.1%, but 3-15% of the shunts become infected and about 50% of them fail after 2 years.[3,4]

The decision to perform a laparoscopic cholecystectomy with routine anesthetic monitoring in a patient with a VP shunt is supported by the two largest case series currently published. Collure et al. published data in 1995 on a series of four patients and Jackman et al. published a series of 18 patients in 2000.[5,6] Both authors concluded that laparoscopic surgery was safe in patients with VP shunts. The primary concerns with performing laparoscopic surgery in the presence of a VP shunt are clinically significant increases in intracranial pressure (ICP) and retrograde shunt failure. Uzzo et al. observed transient increases in ICP during laparoscopic procedures on two children with VP shunts.[7] As a result, they advised routine ICP monitoring in patients with VP shunts undergoing laparoscopic surgery. This effect has also been shown in animal models.[8,9] However, this increase in ICP has never been shown to be clinically significant and the risks of invasive ICP monitoring likely outweigh any risk of adverse events.

Retrograde shunt failure resulting in pneumocephalus is another concern, but to-date there are no reports of this in the literature. Multiple methods have been described to reduce the risk of retrograde shunt failure, including clamping or clipping of the intraperitoneal end of the catheter, exposure and clamping of the subcutaneous portion of the catheter, and externalization of the intraperitoneal

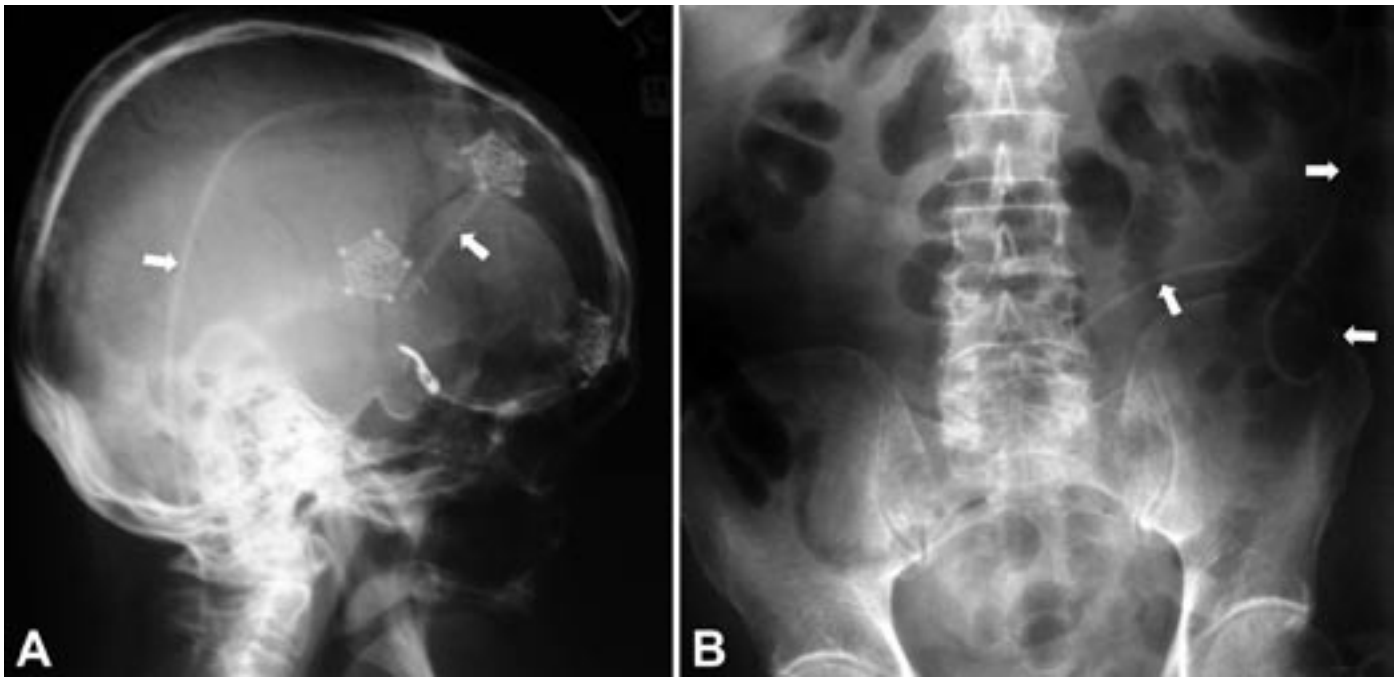

Figure 1.— A. Radiograph of the Head with the Course of the VP Shunt Indicated by the Arrows; B. Radiograph of the Abdomen with the VP Shunt (indicated by the arrows) Seen on the Patient's Left Side with the Intraperitoneal Yip at the Midline

portion of the shunt for the duration of the case.[10-12] Based upon in vitro testing of VP shunts however these procedures appear to be unnecessary.[13] Of nine shunts tested to retrograde pressures of 350 mm Hg none resulted in failure of the valve. There was noted to be deformation in the shape of some shunts at pressures as low as 80 mm Hg, but the actual risk of reflux of carbon dioxide across the shunt at the pressures used in laparoscopy seems minimal. In fact, in the case series reported by Collure et al., drainage of cerebral spinal fluid from the intraperitoneal end of the catheters was noted during laparoscopy in all four patients.[5] The lack of reports in the literature of retrograde shunt failure and the in vitro testing would suggest that clamping or externalization of the shunt catheter is probably unnecessary. One might postulate that clamping of the shunt could actually exacerbate increases in ICP.

The review of the literature did reveal two case reports of complications related to laparoscopic surgery in patients with VP shunts. In one case a patient undergoing laparoscopic cholecystectomy ten days after placement of a VP shunt developed subcutaneous emphysema along the catheter tract.[14] In a second case a patient with a VP shunt placed five days prior developed lethargy and apnea after laparoscopic jejunostomy tube placement.[11] The shunt failure was determined to be a distal occlusion that resolved with irrigation. Although the patient underwent an emergent neurosurgical procedure to resolve the occlusion the author indicates that active pumping of the shunt reservoir probably would have cleared the obstruction. Both cases emphasize that elective laparoscopic cases should probably be delayed in patients with recently placed VP shunts.

Conclusion

Laparoscopic surgery in adults with established VP shunts utilizing routine anesthetic monitoring appears to be safe. Currently there is no evidence to suggest that clamping or externalization of the catheter is necessary. A neurosurgery consult prior to surgery to verify the proper functioning of the VP shunt is recommended. The surgeon should note the path of the catheter within the abdominal wall to avoid inadvertent damage to the catheter during trocar placement. In addition, the surgical team and the anesthesiologist should be aware of the location of the shunt reservoir so it can be pumped if necessary. Finally, it is important to ensure that the intraperitoneal portion of the catheter is not twisted or obstructed prior to decompression of the abdomen.

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References

1. Pudenz RH. The survival treatment of hydrocephalus- a historical review. *Surg Neurol* 1981;15:15-26.
2. Bondurant CP, Jimenez DF. Epidemiology of cerebrospinal fluid shunting. *Pediatr Neurosurg* 1995;23:254-9.
3. Drake JM, Kestle JRW, Milner R, et al. Randomized trial of cerebrospinal fluid shunt valve design in pediatric hydrocephalus. *Neurosurgery* 1998;43:294-303.
4. Kulkarni AV, Drake JM, Lamberti-Pasculi R. Cerebrospinal fluid shunt infection: a prospective study of risk factors. *J Neurosurg.* 2001;94: 195-201
5. Collure DW, Bumpers HL, Luchette FA, Weaver WL, Hoover EL. Laparoscopic cholecystectomy in patients with ventriculoperitoneal (VP) shunts. *Surg Endosc.* 1995 Apr;9(4):409-10.
6. Jackman SV, Weingart JD, Kinsman SL, Docimo SG. Laparoscopic surgery in patients with ventriculoperitoneal shunts: safety and monitoring. *J Urol.* 2000 Oct;164(4):1352-4.
7. Uzzo RG, Bilsky M, Mininberg DT, Poppas DP. Laparoscopic surgery in children with ventriculoperitoneal shunts: effect of pneumoperitoneum on intracranial pressure-preliminary experience. *Urology.* 1997 May;49(5):753-7.
8. Josephs LG, Este-McDonald JR, Birkett DH, Hirsch EF. Diagnostic laparoscopy increases intracranial pressure. *J Trauma.* 1994 Jun;36(6):815-8
9. Halverson A, Buchanan R, Jacobs L, et al. Evaluation of mechanism of increased intracranial pressure with insufflation. *Surg Endosc.* 1998 Mar;12(3):266-9.
10. Al-Mufarrej F, Nolan C, Sookhai S, Broe P. Laparoscopic procedures in adults with ventriculoperitoneal shunts. S*urg Laparosc Endosc Percutan Tech.* 2005 Feb;15(1):28-9.
11. Baskin JJ, Vishteh AG, Wesche DE, Rekate HL, Carrion CA. Ventriculoperitoneal shunt failure as a complication of laparoscopic surgery. *JSLS.* 1998 Apr-Jun;2(2):177-80.
12. Kimura T, Nakajima K, Wasa M, et al. Successful laparoscopic fundoplication in children with ventriculoperitoneal shunts. *Surg Endosc.* 2002 Jan;16(1):215.
13. Neale ML, Falk GL. In vitro assessment of back pressure on ventriculoperitoneal shunt valves. Is laparoscopy safe? *Surg Endosc.* 1999 May;13(5):512-5.
14. Schwed DA, Edoga JK, McDonnell TE. Ventilatory impairment during laparoscopic cholecystectomy in a patient with a ventriculoperitoneal shunt. *J Laparoendosc Surg.* 1992 Feb;2(1):57-9.

Physician Workforce: Addressing Shortages in Hawai'i

Roy Magnusson MD, MS; Associate Dean for Clinical Affairs, John A. Burns School of Medicine, University of Hawai'i (JABSOM)

In the February 2010 Medical School Hotline, we reviewed initial findings of a JABSOM study commissioned by the Hawai'i State Legislature to assess trends in physician workforce in Hawai'i. The results demonstrated that the population adjusted physician workforce of actively practicing physicians in Hawai'i is lower than national norms and that this deficit will grow rapidly over the next 20 years.[1]

In March, the performance of the State was assessed against seven recommendations made by the Physician Workforce Task Force of the American Association of Medical Colleges published in June of 2006. Initial steps have been taken with several of the recommendations such as increasing the size of the medical school class and the availability of graduate medical education programs which remain important but incomplete in addressing the developing physician shortages.[2]

While it makes sense to start with general assessments of overall numbers of physicians and training positions in the state, the reality is that solving workforce shortages will require attention to additional factors. In this article key factors are considered in addressing the training and distribution of the physician workforce in an Island state.

Lessons from Civil Defense

On February 27th, 2010, an earthquake measuring 8.8 on the Richter scale hit Chile creating a tidal wave in the Pacific. Tsunami watchers sounded the alarm that set off a series of well orchestrated efforts to preserve life and property. While several elements of the plan were centralized and/or standardized (e.g. tracking the wave or sounding sirens) key elements of the assessment of risk, emergency services, and evacuation plans were distinctly local. Rural communities are often isolated in a disaster but none so much as an island community. Planning must take into consideration local challenges and include Island specific solutions.

Using this same State/local self-sufficiency approach will be important when planning health service delivery, as resources, including physicians, become scarcer. JABSOM can provide a statewide workforce assessment with trained medical students and post-graduate trainees (Residents and Fellows). The Department of Health can contribute specific plans for the integration of disease/injury focused or population focused health services. Recruitment, retention, and distribution of physicians to best serve the population will require collaboration by hospital systems. The needs of each Island individually and the State collectively will need to be considered. Leaders across the state are examining creative ways to address these issues.

Recent promising activities to improve the situation of physician shortages that should be encouraged and expanded are:

Area Health Education Center (AHEC) Workforce Assessment

In the December, 2009 issue of the Hawai'i Medical Journal, Withy et al. reported a detailed assessment of the physician workforce on the Big Island:

"The Hawai'i Island Health Workforce Assessment used licensure data, focus groups, telephone follow up to provider offices, national estimates of average provider supply and analysis of insurance claims data to assess the extent of the existing medical and mental health workforce, approximate how many additional providers might be effectively utilized, to develop a population-based estimate of future demand and identify causes and potential solutions for the challenges faced."[3]

The result of this study is an understanding of the physician workforce needs and potential solutions for the Big Island. This work needs to continue. It should include assessment of statewide assets and, more importantly, provide island specific information to those planning for local and statewide health service. Workforce development should be assessed centrally in a standard fashion, but implementation at the local levels must be considered to ensure success.

Hawai'i Island Health Care Alliance

In response to growing concerns about loss of physicians practicing on the Big Island of Hawai'i, the Hawai'i Island Health Care Alliance was formed. This group is a coalition of hospitals, medical groups, federally qualified health clinics, government, labor, community leaders, health educators, and business leaders. Using information provided by AHEC, guiding principles were developed that included taking an Island-wide approach, collaboration, inclusive discussions, primary care and illness/injury prevention focus, and the initiation of short and long term strategies. Also developed were specific recruitment goals and performance measurements to assess their progress. Long term objectives include financially stable local hospitals, recruitment of 30 physicians for the Big Island of Hawai'i, and the establishment of a family medicine residency on the Island.

The group realized that in rural communities, hospitals do not recruit physicians, communities do. The retention of physicians is directly related to their work environment, peer support and impression of the community. The progress of this work in the coming years will be tracked with great interest. Other Island communities should consider initiating a similar approach to health workforce assessment and planning.

Trauma and Emergency Services Planning

When dealing with disaster, whether caused by tsunami, multiple occupant car crash or other occurrence needing emergency medical care, it is essential to have a comprehensive plan that provides local care and stabilization, as well as, evacuation to higher levels of care. This approach has a definite impact on the planning for physician workforce in an island community. Primary care, emergency care, and basic specialty care should also be available in the community. Unique specialists or specialties that require intensive care support

should be centralized in outstanding regional centers. In 2009, an updated State Trauma Plan was approved. It is a strong plan that advocates a Level III trauma center at Wilcox, Maui Memorial, Kona Hospital, Hilo Medical Center and Tripler Medical Center) and a Level I Trauma Center on O'ahu (The Queen's Medical Center). Advanced planning for systems of care, including efficient inter-hospital transfer of care, will allow for optimal use of the physicians available locally and in designated centers of excellence.

Residents and Students in Community Settings

To encourage physicians to consider practices in smaller communities, opportunities for students and residents to be exposed to practice settings outside of Honolulu must be created. In the past 18 months, resident rotations from Oahu based programs have been initiated at Maui Memorial (OB-GYN) and Hilo Medical Center (Family Medicine). Currently, Hilo Medical Center is working with JABSOM and its Department of Family Medicine and Community Health to establish a three-year residency program in Family Medicine at the Hilo Medical Center. This would be the first residency outside of Oahu. As the JABSOM class expands, clinical preceptors in the community will have opportunities to encourage students and perhaps residents to consider a future practice in that setting. Recent discussions with Kona Hospital and Castle Medical Center may result in expanded student rotations as soon as 2011.

Interdisciplinary Care Teams

Expansion of physician training and improving recruitment efforts will diminish the impact of the workforce trends but not completely resolve them. There will be strong pressure to make effective use of all healthcare providers including nurse practitioners, physician assistants, pharmacists and others. Much of the discussion to date has been about promoting independent practice which may help to an extent, but it perpetuates an old and inefficient system of primary care. At the Hawai'i Island Family Health Center in Hilo, the plan is to train pharmacists, registered nurses, advanced practice nurses and family physicians in the same setting. The objective is to make full use of the training of each professional in an organized, efficient system. In this new model of primary care, multiple disciplines co-manage patients using consensus care plans and standardized best practices. The skill sets of various disciplines are used to complement and not replicate each other. In such a model, an advance practice nurse can deliver much of the standard outpatient care and education following standardized care approaches developed in conjunction with physicians. The pharmacist can track lab results and adjust medication dosing while the physician manage complex issues and review care that falls outside of protocol.

In times of shortage, it is common to see legislative requests to expand the scope of care of several health professionals. This must be resisted without concrete evidence of comparable training. These shortcuts confuse the public by creating the impression that limited classroom or observational training in a subject matter over the course of a few weeks is equivalent to more extensive supervised training and hands-on care delivery that medical students obtain and reinforce in years of residency training. Extending the scope of practice of minimally trained disciplines does not increase the number of qualified providers and will most certainly erode the quality of care provided. Such unwarranted scope creep by non-physicians is not in the public interest and should never be accepted by the public.

The physician workforce shortage is real. Expanding the pipeline by enlarging the medical school class size and residency opportunities in Hawai'i are our best way to increase the number of physicians in the State. However, important strategies that need to be pursued energetically are a detailed study of current distribution, local planning for recruitment and retention, training physicians in settings across the State, and building models to optimize the contribution of all specialties.

References

1. Magnusson, R. Developing Shortage of Physicians. *Hawaii Med J.* February 2010; 69(2):49-50.
2. Magnusson, R. Expanding the Pipeline to Meet the Growing Demand for Physicians. *Hawaii Med J.* March 2010; 69(3):75.
3. Withy K, Andaya J, Vitousek S, Sakamoto D. Hawai'i Island Health Workforce Assessment 2008. *Hawaii Med J*; 68(11):268.

COMMENTARY

ROBERT C. MARVIT MD, MSC; PRESIDENT, HAWAI'I MEDICAL ASSOCIATION

Presidential Musings

Mindfulness is the quality of being fully present and attentive in the moment. The essence of inquiry is to ask an impertinent question to get a pertinent answer.

Words seem so innocent and powerless standing in the dictionary. They become a force for good and evil in the hands of those who know how to combine them.

We physicians will face a host of new challenges over the next several years as the healthcare system undergoes reform. Restructuring will likely result in reduced physician compensation and autonomy. There will be increased time pressures as well as boggling new administrative demands.

All of these factors impact the physician-patient relationship. Loss of trust, confidence, lack of satisfaction and noncompliance are just a few of the negative responses. We must remember that the most important and meaningful aspect of practice is taking care of patients, restoring health and relieving suffering. We can't solve problems by using the same kind of thinking we used when we created them.

Dramatic changes can take place in the world in a seemingly sudden and unexpected way. Change really doesn't occur in proportion to pressure being applied, but rather change occurs when the accumulation of pressures on the system is great enough to overcome inertia. This is called the "tipping point."

So if change is to occur, are we in a position to direct this change, and do we have a vision for where we would like to go? We all lead busy lives and it is tempting to sit on the sidelines and watch a scene. unfold. However, if we are at a tipping point, it may be worth remembering that even the smallest of influences can have a significant impact. The future of the profession could be determined by the participation in our organizational process.

UPCOMING CME EVENTS

Interested in having your upcoming CME Conference listed? Please contact Nathalie George at (808) 536-7702 x103 for information.

Date	Specialty	Sponsor	Location	Meeting Topic	Contact
May 2010					
5/4-5/7	PD	Pediatric Orthopaedic Society of North America	Hilton Waikoloa Village	POSNA/APOA Annual Meeting	Tel: (847) 698-1692 Web: www.posna.org
5/7-5/8	Multi	Department of Native Hawaiian Health, John A Burns School of Medicine	Waikiki Beach Marriott Resort & Spa	He Huliau -- A Turning Point: Eliminating Health Disparities in Native and Pacific Peoples - Metabolic Syndrome and Health Equity	Tel: (808) 692-1255 Email: native@hawaii.edu
July 2010					
7/3-7/9	DR	Radiology Department, Stanford School of Medicine	Kea Lani Hotel, Maui	18th Annual Diagnostic Imaging Update	Tel: (888) 556-2230 Web: radiologycme.stanford.edu
7/3-7/9	PD	Childrens Hospital Los Angeles Medical Group	Hyatt Regency Maui, Kaʻanapali Beach, Maui	Pediatrics in the Islands: Clincal Pearls	Tel: (323) 361-2752 Web: www.childrenshospitallamedicalgroup.org
7/4-7/9	OBG	University of California, San Francisco	Hapuna Beach Prince Hotel, Hawaiʻi	Essentials of Women's Health: An Integrated Approach to Primary Care and Office Gynecology	Tel: (415) 476-4251 Web: www.cme.ucsf.edu
7/10-7/15	IG, N	Alzheimer's Association	Hawaiʻi Convention Center, Honolulu	2010 International Conference on Alzheimer's Disease	Tel: (312) 335-5790 Web: www.alz.org/icad/2010_icad.asp
7/11-7/16	IM, FM	Kaiser Permanente	Wailea Beach Marriott, Maui	19th National Kaiser Permanente Internal & Family Medicine Symposium	Tel: (800) 700-2636 Web: www.meetingsbydesign.com
7/19-7/23	PD	Kaiser Permanente	Hyatt Regency, Maui	28th Kaiser Permanente National Pediatric Conference	Tel: (800) 700-2636 Web: www.meetingsbydesign.com
7/25-7/29	ORS	Kaiser Permanente Hawaiʻi/ Hawaiʻi Consortium for Continuing Medical Education	Grand Hyatt, Kauaʻi	18th Annual Kaiser Hawaiʻi Update in Orthopaedic Surgery Conference	Tel: (877) 843-8500 Web: www.cmxtravel.com
7/26-7/29	DR	Radiology Department, Stanford School of Medicine	Hyatt Regency, Maui	4th Annual LAVA (Latest Advances in interVentionAl techniques)	Tel: (888) 556-2230 Web: radiologycme.stanford.edu
August 2010					
8/2-8/6	AN	Dannemiller	Sheraton Maui Resort, Maui	Hawaiʻi Anesthesiology Update 2010	Tel: (800) 328-2308 Web: www.dannemiller.com/live-events
8/10-8/13	EM	University of California, Davis School of Medicine	Grand Wailea, Maui	Emergency Medicine Update: Hot Topics 2010	Tel: (916) 734-5390 Web: cme.ucdavis.edu/conferences
September 2010					
9/28-10/2	NRN	Western Neuroradiological Society	Fairmont kea Lani, Maui	42nd Annual Meeting	Web: www.wnrs.org
October 2010					
10/3-10/7	PMM	Ironman Sports Medicine Conference	Royal Kona Resort, Kailua-Kona, Hawaiʻi	22nd Annual Ironman Sports Medicine Conference	Tel: (877) 843-8500 Web: www.cmxtravel.com

10/17-10/22	Multi	Scripps Conference Services & CME	Kaua'i Marriott Resort & Beach Club, Kaua'i	9th Annual Destination Health: Renewing Mind, Body and Soul Email: med.edu@scrippshealth.org	Tel: (858) 652-5400 Web: www.scripps.org/conferenceservices
10/23-10/29	U	Western Section of the American Urological Association	Hilton Waikoloa Village	86th Annual WSAUA Meeting	Web: http://www.wsaua.org/hawaii2010/2010.htm
10/31-11/5	R	University of California, San Francisco	The Fairmont Kea Lani, Wailea, Hawai'i	Abdominal and Thoracic Imaging on Maui	Tel: (415) 476-4251 Web: www.cme.ucsf.edu
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11/1-11/5	AN	California Society of Anesthesiologists	Mauna Lani Resort & Spa, Kailua-Kona, Hawai'i	2010 CSA Fall Hawaiian Seminar	Web: www.csahq.org
11/7-11/10	R	Department of Radiology, Duke University	Hyatt Regency Maui, Ka'anapali Beach, Maui	A Comprehensive Review of Musculoskeletal MRI	Web: www.radiology.duke.edu
11/15-11/17	PD	Lucile Packard Children's Hospital	Mauna Lani Bay Hotel, Kohala Coast, Hawai'i	Popular Pediatric Clinical Topics	Web: www.lpch.org/CME Courses
January 2011					
1/16-1/19	ORS	Vindico Medical Education	Grand Hyatt Kaua'i	Orthopedics Today Hawai'i 2011	Web: www.othawaii.com
1/16-1/21	OPH	Vindico Medical Education	Hyatt Regency Maui, Ka'anapali Beach, Maui	Retina 2011	Web: www.retinameeting.com
1/16-1/21	OPH	Vindico Medical Education	Hyatt Regency Maui, Ka'anapali Beach, Maui	Hawaiian Eye 2011	Web: www.osnhawaiianeye.com
1/24-1/28	AN	California Society of Anesthesiologists	Mauna Lani Resort & Spa, Kailua-Kona, Hawai'i	2011 CSA Winter Hawaiian Seminar	Web: www.csahq.org
May 2011					
5/14-5/19	P	American Psychiatric Association	Hawai'i Convention Center, Honolulu	164th Annual Meeting	Tel: (703) 907-7300 Web: www.psych.org
October 2011					
10/24-10/28	AN	California Society of Anesthesiologists	Grand Hyatt, Poipu Beach, Kaua'i	2011 CSA Fall Hawaiian Seminar	Web: www.csahq.org
January 2012					
1/23-1/27	AN	California Society of Anesthesiologists	Hyatt Regency Maui, Ka'anapali Beach, Maui	2012 CSA Winter Hawaiian Seminar	Web: www.csahq.org

Upcoming in the Journal

Pilot Study on the Safety and Tolerability of Extended Release Niacin for HIV-infected Patients with Hypertriglyceridemia

Splenic Rupture: A Case of Massive Hemoperitoneum Following Therapeutic Colonoscopy

Profile of Methicillin-resistant Staphylococcus aureus among Nursing Home Residents in Hawai'i

Prevention of Community-Associated Methicillin-Resistant Staphylococcus aureus Infection Among Asian/Pacific Islanders: A Qualitative Assessment

The Impact of Parent-Child Discussions and Parent Restrictions on Adolescent Alcohol Consumption

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THE WEATHERVANE

RUSSELL T. STODD MD, CONTRIBUTING EDITOR

❖ CONFESSION IS GOOD FOR THE SOUL BUT BAD FOR ONE'S REPUTATION.

Lancet, the British medical journal, has finally issued a mea culpa by offering a full retraction of the flawed study published in 1998 which linked MMR (measles-mumps-rubella) vaccine to autism. The erroneous study was quoted widely and sent many parents in the United Kingdom and United States away from protecting their children. The media-wise lead author, Dr. Andrew Wakefield, enjoyed the respectability the Lancet gave him even through previous and later studies demonstrated that no such connection existed. Lancet didn't even back down when it was revealed in 2004 that Dr. Wakefield had been paid for his "study" by a lawyer who was representing autistic children. Now the General Medical Council, Britain's medical regulator, ruled recently that Dr. Wakefield had acted "dishonestly and irresponsibly" and had been untruthful about his patients and his funding with a "callous disregard" for the children.

❖ IF IT SEEMS STUPID BUT IT WORKS, IT ISN'T STUPID.

Major airports around the world are now using the full-body scanner. The device will allow inspectors to determine if any traveler is carrying anything illegal under their clothes. This additional invasion of privacy is justified by the attempt of the Christmas day passenger to blow up Northwest flight 253 flying into Detroit. The man allegedly had a bomb made of PETN (pentarithritol tetranitrate) large enough to blow a hole in the aircraft, stashed in his underwear. The crotch-bomber was identified as Umar Farouk Abdul Mutallab and was found to have ties to al Qaeda. Alarmingly, it was also found that intelligence authorities had been warned about the suspect, but failed to get his name on a watch list. Forty full-body scanners are now in use at 19 US airports, including Dallas-Fort Worth and San Francisco. Some airports are using it for all passengers while others are singling out certain individuals for additional screening. No doubt that a person could hide a piano inside those baggy pants some kids wear.

❖ NOTHING IS ILLEGAL UNTIL YOU GET CAUGHT.

And on the subject of airline security, a German reptile collector was arrested at Christchurch International Airport on South Island, New Zealand, when we tried to board an overseas flight with forty-four (44) geckos and skinks somehow secreted in his underwear! Hans Kurt Kubus, age 58, is to be deported to Germany when he is released from prison. Kubus admitted that he traded in exploited species without a permit and hunts protected wildlife without authority. He pleaded guilty to two violations under the Wildlife Act and five under the Trade in Endangered Species Act. Book him, Danno. The Rescuers Down Under come to life.

❖ TAKE TWO ASPIRIN AND CALL ME – AN ONCOLOGIST.

The Nurses Health Study involved 4,164 nurses who had been diagnosed with breast cancer and followed between 1974 and 2006 or until their death. Data were collected on a regular basis and findings were published in the Journal of Clinical Oncology. Chief author, Michelle D. Holmes MD, at Harvard University found that those who took aspirin two to five times a week were 71% less likely to have a tumor recurrence. Comparing overall users to nonusers, the figure was a 50% reduction in return of cancer. Dr. Holmes was quick to emphasize that these data were based on questionnaires the participants filled out and did not prove aspirin contributed to the women's survival advantage. She also stated, "This is a very important study that suggests taking aspirin might be beneficial for women who previously had breast cancer." Wow! If cheap old aspirin can be substituted for some of these very expensive cancer follow-up drugs the potential for savings is huge.

❖ CATCH A BULLET? FORGET THE COLLAR, SEE A DOCTOR. MORE HASTE, LESS WASTE!

Elliott Haut MD, is a trauma surgeon at Johns Hopkins Hospital in Baltimore, and sees an average of one gunshot wound each day. He wondered about patient survival related to possible delay in transport. Emergency protocols for gun shot wounds call for patient stabilization before immediate transport to the trauma center. To stabilize the spine, para-medics must wrap a cervical collar around the patient's neck, and strap the person to a long board to keep vertebrae from shifting during transport. With his colleagues Dr. Haut scanned a nationwide data base of 45,000 patients treated for gunshot wounds. Reporting in the *Journal of Trauma*, Dr. Haut's numbers showed that 15% of patients who received spine immobilization died in the hospital, compared with 7% of those not immobilized. Factors such as wound severity, gender, race and age did not account for any difference. Dr. Haut emphasized that the greater death rate among people in this study who got spine immobilization underscores that the delay factor is the enemy.

❖ AIRLINES PILOTS: YOU SNOOZE, YOU LOSE. IT TAKES A MERE FIVE YEARS FOR CONGRESS TO GO FROM RUMOR TO ACTION.

In light of recent documented episodes of pilot fatigue in the cockpit, it seemed like a logical and reasonably simple process to revamp long outdated Federal Aviation Administration rules. Au contraire! Various industry groups have squared off in efforts to sway the Senate aviation subcommittee. The rule changes for US skies should reflect the latest scientific principles involving sleep and work cycles. The first big casualty of the process is the concept of allowing short naps at high altitude under tightly controlled conditions. Union and industry officials expressed support for the idea of controlled napping, but both the FAA and some lawmakers are opposed. There is broad scientific support for controlled napping, but the FAA spokesperson said "I don't expect we will be proposing that." The largest US pilot union is pushing for fatigue safeguards that would treat all industry segments the same, but cargo and commuter airlines argue that imposing uniform pilot-scheduling rules would hurt them financially and put them at a huge disadvantage. So, a much needed update in flying regulations won't happen before the end of 2009 as originally planned, and may not even be in place by the end of 2010. Moreover, airline officials are saying they will need two years delay to plan for the rule changes.

❖ BUT DOCTOR, THE VAS DEFERENS IS VASTLY DIFFERENT.

According to the medical history, Twana Sparks MD, ENT surgeon in Silver City, New Mexico, for years made a practice of performing genital exams on her male patients without their consent while they were under anesthesia. It was no secret among the surgical staff at Gila Regional Medical Center, and it was a running joke with quotes like, "Now I realize that ENT stands for ears, nuts and testicles." In one particular episode following a tympanoplasty, Dr. Sparks examined the patient's genitals and found swelling suggestive of sexually transmitted disease on the right side of the penile shaft. She shouted, "Oh, gross!" slapped the penis three times and said, "Bad boy, bad boy, bad boy." The all-female OR staff laughed except for the CRNA Alison Garner who was performing anesthesia. She reported the violation to the director of anesthesia and ultimately the New Mexico Medical Board. Dr. Sparks was outraged, "How dare you report me?" The outcome: the doctor made a deal with the Medical Board in which she keeps her license but cannot see patients without a chaperone and cannot perform any genital, rectal or breast exams for any reason. Meanwhile, CRNA Garner was first accused by hospital officials of a HIPAA violation for talking to a patient's daughter, and subsequently suspended for "grossly negligent care." So the moral of this ethical story is when blowing the whistle on a hospital cash cow wear a crash helmet. After all, how much income does a CRNA bring into a hospital?

❖ NOW THIS IS WEED WITH REAL AROMA.

Police stopped a "honey wagon" septic tank truck about 35 miles south of Tucson, Arizona, on interstate 19, a major thoroughfare for human and drug traffic moving north out of Mexico. The truck license was invalid as were the commercial vehicle markings so the officer investigated further. Mixed in with the human waste police found several red and yellow bundles of marijuana weighing a total of 743 pounds. Put that in your roll-your-own and light up!

ADDENDA

❖ According to the United Health Foundation the average American male has added 17.1 lbs since 1988 while the average female has added 15.4 lbs. The average Texas male added 24.2 lbs and the average New Jersey female put on 26.2 lbs.

❖ A *Playboy* study revealed that three out of ten Americans want the government to limit the salaries of athletes and movie stars to one million dollars a year.

❖ The term "software" was coined in 1958 by Princeton professor John W. Tukey.

❖ Save the whales! Do like the Japanese and collect a whole set.

ALOHA AND KEEP THE FAITH — **rts**■

(Editorial comment is strictly that of the writer.)

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