Award Number: W81XWH-07-2-0064

TITLE: The Economic and Quality of Life Impact of Remote Technologies on High Risk Patients and Their Caregivers

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PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

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**Title:** The Economic and Quality of Life Impact of Remote Technologies on High Risk Patients and Their Caregivers

**Abstract:**
This pilot study compares the clinical outcomes, economic impacts, and patient and caregiver ratings of Quality of Life and satisfaction of a Remote Technology (RT) intervention to Home Health Aide (HHA) intervention or Usual Care (UC). 28 high-risk patients with ESRD were randomized into 3 groups for intervention: RT, HHA, or UC. The pre-intervention surveys of Quality of life, satisfaction, and health utilities were conducted. Measurements of healthcare resource utilization including ER visits and hospitalizations have been initiated as well as a mechanism to gather economic evaluations to calculate marginal cost-effective ratios for RT and HHA. Implementation of interventions was delayed for almost 6 months because we underestimated the time required for the IRB review process and our process of randomization to either HHA or RT was flawed. We did not appreciate that chronically ill patients with a high disease burden have developed an unspoken system of support and coping. Home intervention must convince the patient/caregiver of its supplemental value; and, the patient/caregiver must be physically capable of performing the required tasks of the intervention. A sharp interest in the Home Electronic Medical (HEMR) created from the uploaded monitoring data for each patient was expressed by physicians when the monitoring equipment was demonstrated A literature review finds little information of the value of a HEMR in decision-making.

**Subject Terms:**
Remote Technologies; Cost Effectiveness; High-Risk Patients; Caregivers; Dependent Care
## The Economic and Quality of Life Impact of Remote Technologies on High Risk Patients and Their Caregivers

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The Economic and Quality of Life Impact of Remote Technologies on High Risk Patients and Their Caregivers

INTRODUCTION:

The care of patients disabled from chronic disease is costly—not only in terms of increased medical expenditures and loss of productivity, but for caregivers, who are more likely to report increased levels of stress. Improved health outcomes using remote technologies have been demonstrated; however, convincing cost-effective analyses have been lacking, and relief of caregiver burden is uncertain. This is a pilot study testing a patient and caregiver-centered Plan of Care (POC) utilizing remote technologies (RT) or a program of home health assistance by Home Health Aides (HHA) compared to a control group of similar patients receiving Usual Care (UC) or optimal dialysis care. Up to thirty high-risk patients from a population of patients with end stage renal disease will be divided into the 3 groups. The objectives are to determine whether home intervention featuring RT will be more cost effective than HHA or UC, and whether patient Quality of Life and caregiver satisfaction will be higher in the RT group.
BODY:

During the first 12 months of the Pilot Study, the project office was established and personnel were hired. Telehealth equipment was researched, purchased and installed, and staff completed extensive training on its use. Meetings were held with medical personnel, including managers and staff from Liberty Dialysis, Hawaii and affiliated nephrologists to explain the project, garner support, and plan for patient recruitment/enrollment. Local and federal approvals were received, permitting us to proceed with the Pilot Study. Patients were recruited, consented, given baseline surveys, and enrolled in one of the three study limbs. Initiation of interventions was delayed three months: the IRB approval process and initial recruitment and enrollment of patients took longer than planned.

The status of each task in the approved Statement of Work follows.

STATEMENT OF WORK: Initial Period (18 months)

Task 1. Conduct all appropriate procedures with institutional review boards (3 months).

Task 1 is complete. IRB approval was to have been completed by month 3. The process took longer than suggested in the early stages of the project, and the time for completion of this task was 6 months:

• 12 October 2007: The project protocol, consent form and supporting documents were sent to the local Institutional Review Board (IRB), Hawaii Pacific Health (HPH) IRB.
• 13 November 2007: HPH IRB granted initial approval to the study documents pending modifications to the protocol and consent form.
• 18 December 2007: HPH IRB approval received; all documentation was sent to ORP HRPO NGTMR, via TATRC, on 19 December.
• 4 February 2008: ORP requested minor modifications to the protocol, consent form and supporting documents; we submitted revisions on 8 February in response to their Initial Memorandum for Record (MFR).
• 21 February 2008: A follow-up MFR recommended submission of the revised protocol documents, including all ORP recommended revisions, to the HPH IRB; our request was submitted to HPH IRB on 22 February.
• 4 March 2008: Received final HPH IRB approval (Appendix 1); documents were then submitted again to ORP.
• 13 March 2008: Final approval to proceed with the project was received from ORP (Appendix 2).

Reasons for the delays included:

1) The St. Francis Healthcare Foundation did not have a Federal Wide Assurance (FWA) number, a requirement for IRB submission. The Foundation applied for the FWA on 24 September 2007, and the FWA number was received on 26 November.

2) Coordination between a local and federal agency, separately at times, simultaneously at others, to receive necessary approvals for the project and to satisfy both agencies’ requirements took longer than expected. We appreciated
USAMRMC ORP HRPO assistance; their feedback was concise and practical in helping us move forward expeditiously with the project.

Task 2. Acquire, install, and test hardware and software for remote monitoring (3 months).

Task 2 is in progress. All equipment has been acquired and tested. We are working with the vendor to reconcile software problems as they arise. Installation is ongoing (please see narrative in Task 4 below.)

Remote technology equipment was selected during the first quarter of the project; quotes were obtained from three vendors. Research staff worked with the selected vendor, VitelNet, to configure the system and to get specifications for IT support in the project office.

Minimal equipment, including the clinical workstation, server, and two remote monitoring units (Turtle 700 units), was initially ordered from VitelNet to enable preliminary training of research personnel and demonstration of capabilities to medical personnel, patients and caregivers. Testing was also done to determine the adequacy of the video-teleconferencing configuration via telephone line vs. internet connection. A VitelNet representative spent one week in the HOPE offices, installing the equipment and training personnel on home installation of the monitoring units and use of equipment, including patient interaction and report acquisition.

Key team members trained on use of the system include the Principal Investigator (PI), Associate PI, Remote Care Coordinator/Home Care Coordinator (RCC/HCC), Project Care Manager, IT Specialist and Administrative Assistant. Since receipt of the first installment, research staff training has been ongoing to ensure complete familiarity with the system prior to installation in patients’ homes.

The remaining remote monitoring units were received from VitelNet during the third quarter. Additionally, VitelNet configured a laptop to serve as a “traveling” workstation/server. This allowed the PI to meet with physicians and Liberty Dialysis personnel in their offices to demonstrate the system’s capabilities and elicit interest in/support for the pilot project.

The plan was to acquire, test, and install 10 remote units by 1 February 2008. As of 18 July 2008, 4 units have been installed in patients’ homes. Reasons for delays included:

1) Final IRB approvals were not received until March 2008, three months later than anticipated. This caused a 3-month delay from the outset for recruitment of subjects, assignment to study limb, and installation of equipment in RT patients’ homes.

2) The recruitment, consent and assignment process was lengthier than anticipated (please see narrative in Task 4 below). This delayed the installation of equipment in patients’ homes.
Task 3. Train healthcare personnel, patients, and caregivers to competency in use of remote technologies (RT).

and

Train Home Health Aide (HHA) in support assistance tasks and monitoring of patients.

Task 3 is ongoing. A VitelNet representative spent one week in the HOPE offices training personnel on home installation of the monitoring units and use of equipment, including patient interaction and report acquisition. Key team members trained on use of the system include the PI and Associate PI, RCC/HCC and Project Care Manager, IT Specialist and Administrative Assistant. Staff training has continued in the interim, to ensure proficiency with the remote monitoring system prior to installation in patients’ homes. Patients and caregivers receive training on use of the remote monitoring equipment upon installation in the home; follow-up training is provided as needed.

One of two home health aides (HHA) was hired and began training during the third quarter. A second HHA was hired a month later. HHA hiring was postponed to conserve funds, since the project had been delayed while awaiting IRB approvals. During the subject recruitment period, the HHAs continued to train for home care responsibilities. One HHA did not pass the probationary period and her employment was terminated.

Task 4. Conduct pilot study of 30 patients (9 months).

- Develop and test study database.
- Gather and enter relevant patient information into database.
- Identify potential subjects using Risk Score stratification.
- Recruit, consent, and enroll patients and caregivers (30 patients).
- Deliver Remote Technology services to study cohort of ten patients using home monitors and video teleconferencing.
- Deliver Home Health Assistance services to study cohort of ten patients.
- Collect data on hospitalization, emergency room utilization, antibiotic use, and fiscal charges on 30 patients.

Task 4 is ongoing. Liberty Dialysis, LLC, a for-profit kidney dialysis company permitted research staff to recruit potential subjects from their local patient population. Several informational meetings were held with Liberty Dialysis staff members during the third and fourth quarters to identify and address potential patient questions and concerns about the study; informal sessions were also conducted with affiliated nephrologists to demonstrate the remote monitoring system and solicit support for the pilot project. The physicians and staff were encouraged to talk about the project and to encourage patients to volunteer for the study.

Final IRB approval was obtained in March 2008. Per the IRB, contact with the patients was limited to an informational letter (Appendix 3), which the patients could express interest
through return mail to meet with a research staff member to explain the study and review the consent document.

Letters were given to 450 patients on the campus of Liberty Dialysis' outpatient dialysis units and the St. Francis Foundation's administrative offices. Ninety-six (96) patients responded positively to the letter and the staff met in person with the patient, caregivers, and family. Forty-three (43) patients agreed to participate and signed consent forms; 4 patients later withdrew and 39 patients were in the original cohort.

Medical information on the consented patients was collected from the Liberty Dialysis database, and a Risk Score was calculated for each individual. The Risk Score (Figure 1), a tool to quantify chronic disease burden, was created as part of an earlier study, and has been shown to correlate with risk of future hospitalization (Figure 2).

**Figure 1: Risk Score Formula**

<table>
<thead>
<tr>
<th>Risk Score</th>
<th>0.0018 (age) + 0.2181 (if PVD present) + 0.3920 (if Albumin&lt;3 G/dl) + 1.1416 (if Karnofsky score &lt;=60)</th>
</tr>
</thead>
</table>

```
Twenty-eight of the remaining 39 patients in the subject pool met the high-risk criteria (Risk Score &gt;=1.2) and were randomly assigned to one of the 3 groups.

HHA and RT interventions began in June. Three patients decided not to participate in the RT group.

- One patient withdrew from the study as he felt the equipment was too complex to handle alone.
- A second patient declined to participate as he needed assistance with personal tasks and had expected to be assigned to the HHA limb of the study.
- A third patient was blind.

Eight patients initially assigned to the HHA limb withdrew from the group. Follow up interviews uncovered a variety of reasons.

- Patients /caregivers regarded the HHA as intrusive.
- Caregivers/patients regarded patients as strong; outside assistance leads to dependency.
- Caregivers wanted respite for several hours, not home services.
- Caregivers felt that their care of the patient was complete and outside help was unnecessary.
Individual patient/caregiver reaction to and the acceptance of HHA or telehealth was more complex than the conclusions derived from focus groups conducted during the design phase of the project. Using the Risk Score, we identified a sub-population of frail and disabled patients with a higher risk for hospitalization, who could potentially benefit from the interventions. We did not appreciate that most of these chronically ill patients and their caregivers have developed an unspoken system of support and coping.

For the Pilot Study we have done away with randomization and have allowed those patients who refused HHA to join either the Control limb or the RT limb. Five patients are receiving HHA services and four patients are participating in the RT limb. An additional 3 patients are on schedule to receive HHA services, and 6 patients will have telehealth equipment installed and remote monitoring initiated, by early August. We continue the recruiting effort to fill openings in study groups. To gain a more complete experience with both types of home interventions and to analyze the results of data collection for trends, we plan to request an extension of the Pilot Study.

**Task 5. Administer quality of life (SF-36) and satisfaction of service (CSQ-8) surveys (9 months).**

Baseline SF-36 and Health Utilities Index (HUI) surveys (Appendices 4 and 5) were completed successfully for all consented patients. CSQ-8 was not administered at the start of the study as the survey measures satisfaction with services. A decision is pending on use of the Labor Supply Survey for the study. The CSQ-8, SF-36, and HUI will be administered to all study participants in September 2008 and in January 2009.

**Task 6. Conduct analysis (3 months).**

- Health resource utilization outcomes of HHA and RT compared to UC.
- Economic cost effectiveness of HHA and RT compared to UC.
- Impact of interventions on caregiver satisfaction with services (CSQ-8).

Preliminary data analysis has begun. Baseline SF-36 and HUI surveys were completed, and preliminary analyses are being conducted to determine whether attitudes can be identified which may be better predictors of acceptance of either the HHA or RT limbs (per narrative under Task 4).

The Risk Score tool is being reevaluated as a screening tool. The premise for using the tool was to identify patients at high risk for hospitalization, who may benefit from home interventions, such as RT or HHA. The Risk Score tool we use to identify our current subjects was developed using data from 1992-2002. We are repeating the analysis using data for a recent 14-month period, January 2007 through February 2008.

Data has been collected on patients for about 4 weeks and has not been analyzed. The initial preliminary analysis will be included in the next Quarterly Report, October 2008.
KEY RESEARCH ACCOMPLISHMENTS:

• established the project office and hired key personnel for the study;
• established communication services;
• selected, purchased and tested the remote technology equipment required for the pilot project;
• created a database and validated the Risk Score tool;
• received local and federal IRB approvals;
• recruited subjects for study: distributed Informational letters to 450 patients, from which 107 “leads” were received;
• conducted individual meetings with 96 patients/caregivers (eleven patients responded that they were not interested in the study);
• obtained signed consents from 43 patients;
• applied Risk Score tool; 28 of the consented patients determined to have high Risk Scores (>=1.2);
• randomly assigned 28 subjects to one of 3 research limbs;
• conducted SF-36 and HUI surveys on consented patients;
• conducted physician interviews to aide in creating Plans of Care (POC) for RT and HHA subjects;
• contacted patients to schedule RT installation and HHA evaluation visits;
• initiated interventions for first increment of RT and HHA subjects.
REPORTABLE OUTCOMES:

Approval of a Continuation Modification request was received 29 May 2008. Funding will be provided for the continuation of research, from 20 December 2008 to 19 January 2010. This study will follow 50 high-risk patients from a population of patients with end stage renal disease, who will be randomized into two groups, RT and UC; the HHA limb will be eliminated during this part of the study. The HHA limb was eliminated because of anticipated budgetary constraints. The priority is to study RT telehomecare in high-risk patients. As there will be only one type of intervention, we do not anticipate the issue of patient/caregiver preference encountered in the Pilot Study.

The intervention will involve remote technology with case management oversight, and the creation of a home electronic medical record (HEMR) from the data generated by the RT intervention, to enable physician access and adjustment of the patient’s plan of care. SF-36 and CSQ-8 will measure patients’ Quality of Life and satisfaction of the provided services. A Physician Satisfaction Survey will measure physician attitudes toward the HEMR. Measures of healthcare resource utilization will include emergency room visits, hospitalizations, hospital days and mortality. Economic evaluations will calculate marginal cost-effective ratios for RT.
CONCLUSION:

We collected data on consented patients and, using a Risk Tool developed in earlier work, identified high-risk patients for future hospitalization. To date, we have enrolled 5 patients in the HHA limb of the project and 4 patients in the RT limb, with commitments to enroll the full complement as designed in the study. Pre-test surveys were performed and we are collecting clinical data for analysis.

We concluded that we did not appreciate that most of the chronically ill patients with a high disease burden, and their caregivers, have developed an unspoken system of support and coping. For home interventions to be accepted, the patient/caregiver must be convinced of its supplemental value; and, the patient/caregiver must be physically capable of performing the required tasks of the intervention. We will continue the SF-36 and HUI surveys, and track the hospitalizations of patients who have dropped out of the project.

Meetings with attending physicians and demonstration of monitoring equipment indicated sharp interest in the Home Electronic Medical Record (HEMR) created from the uploaded monitoring data for each patient. A review of the literature finds little information of the value of a HEMR in decision-making and the delivery of office care.

To complete the tasks, we will be requesting a 3-month extension of the Pilot Project.

The second phase of the project will include evaluation of a better mechanism to inform patients/caregivers about the project without violating the intent of the IRB and a survey instrument to measure physician attitude and value of the HEMR.

The issue of the patient choice of intervention will not occur in the second phase of the study as the HHA limb will be eliminated.
REFERENCES:

n/a
APPENDICES:

1. Hawaii Pacific Health Institutional Review Board Approval Letter
2. USAMRMC ORP HRPO Approval Letter
3. Patient Information Letter
4. SF-36 Health Survey
5. Health Utilities Index (HUI)
6. Curriculum Vitae: Steven J. Berman, MD – Principal Investigator
March 4, 2008

Steven Berman, M.D.
St. Francis Healthcare Foundation
2226 Liliha Street Room B115
Honolulu, HI 96817

RE: R07-118-2-HMC1
    Project Title: The Economic and Quality of Life Impact of Remote Technologies on High Risk Patients and Their Caregivers [version 5 dated 3/4/08].

Dear Dr. Berman:

The Hawaii Pacific Health Institutional Review Board (IRB) is in receipt of your modification request dated February 22, 2008 which included a USAMRMC Memorandum for Record, revised HPH Application Form 1, revised protocol (version 5 dated 3/4/08) – tracked and clean copy, and revised informed consent and authorization form (version dated 5 February 2008) – tracked and clean copy.

The modifications to the protocol (version 5 dated 3/4/08), Informed Consent and Authorization Form, and study personnel have been reviewed and approved by the IRB via expedited review on March 4, 2008. As the protocol changes include the deletion of patients not capable of providing their own consent, the previously approved waiver of HIPAA authorization is no longer applicable and approval of this waiver (Form 4B) has been withdrawn. Your approval dates remain unchanged and will expire on November 5, 2008. A Continuing Review Report must be submitted on or about September 1, 2008.

Enclosed is your IRB stamped approved Informed Consent and Authorization Form. Please use this version when enrolling subjects.

If you intend to make changes during the course of your project which will affect the human subjects involved, you must obtain IRB approval prior to implementing these changes.

Any Serious Adverse Event (SAE) or Unanticipated Adverse Event (UAE) must be reported immediately to either the IRB Chairperson or the IRB Administrative Office. A written report of the SAE or UAE must be submitted to the IRB within five calendar days. Any non-serious adverse events that may not be directly related to the study must also be reported within 45 days.

If you have any questions, please contact Nina Miyata at 522-4581.

Sincerely,

[Signature]

David T. Horio, MD
Chair, Institutional Review Board

DH/nm

Enclosures: Informed Consent and Authorization Form (version dated 5 February 2008)

cc: Kathy Wooldridge
A-14200, HRPO Approval Memorandum (Proposal Log Number 06167002, Award Number W81XWH-07-2-0064) (UNCLASSIFIED)

Duchesneau, Caryn L Ms USAMRMC <Caryn.Duchesneau@us.army.mil>  
To: sjberman@gmail.com  
Cc: Kathy Wooldridge <kathyathope@gmail.com>, "Saiki, Stanley Dr Hui TAMC" <Stanley.Saiki@med.va.gov>, "Bennett, Jodi H Ms USAMRMC" <Jodi.Bennett@us.army.mil>, "Duchesneau, Caryn L Ms USAMRMC" <Caryn.Duchesneau@us.army.mil>, "Bosch, Laura R COL USAMRMC" <Laura.Bosch@us.army.mil>, "Ciccarello, Brigit - Geneva Foundation" <ciccarello@tatr.org>, sanders@tatr.org, "Sawyer, Lisa M. Ms. USAMRRAA" <lisa.sawyer@darmy.mil>, "Wilberding, Julie A Dr AMDEX" <Julie.Wilberding@darmy.mil>, "Eaton, Karen M Ms AMDEX" <Karen.M.Eaton@us.army.mil>

Classification: UNCLASSIFIED  
Caveats: NONE


1. The subject protocol (version 5/ dated 4 March 2008) was approved by the Hawaii Pacific Health Institutional Review Board (HPH IRB) on 4 March 2008. This protocol was reviewed by the U.S. Army Medical Research and Materiel Command (USAMRMC), Office of Research Protections (ORP), Human Research Protection Office (HRPO) and found to comply with applicable Federal, DOD, U.S. Army, and USAMRMC human subjects protection requirements.

2. This no greater than minimal risk study is approved for the enrollment of 30 subjects.

3. Please note the following reporting obligations:

   a. Major modifications to the research protocol and any modifications that could potentially increase risk to subjects must be submitted to the USAMRMC ORP HRPO for approval prior to implementation. All other amendments must be submitted with the continuing review report to the HRPO for acceptance.

   b. All unanticipated problems involving risks to subjects or others, serious adverse events related to study participation, and deaths related to study participation must be reported promptly to the HRPO.

   c. Any deviation to the subject protocol that affects the safety or rights of the subject and/or integrity of the study data must be

---

http://mail.google.com/mail/?ui=2&ik=a3e84226c&view=pt&search=all&in=msg:118aad018e7f1242
reported promptly to the HRPO.

d. All modifications, deviations, unanticipated problems, adverse events, and deaths must also be reported at the time of continuing review of the protocol.

e. A copy of the continuing review report approved by the HPH IRB must be submitted to the HRPO as soon as possible after receipt of approval. It appears the next continuing review by the HPH IRB is due no later than 1 September 2008.

f. In addition, the current version of the protocol and consent form must be submitted along with the continuing review report and the HPH IRB approval notice for continuation of the protocol.

g. The final study report submitted to the HPH IRB, including a copy of any acknowledgement documentation and any supporting documents, must be submitted to the HRPO as soon as all documents become available.

4. Do not construe this correspondence as approval for any contract funding. Only the Contracting Officer or Grants Officer can authorize expenditure of funds. It is recommended that you contact the appropriate contract specialist or contracting officer regarding the expenditure of funds for your project.

5. The HRPO point of contact for this study is Karen M. Eaton, MS, Human Subjects Protection Scientist, at 301-619-9268/karen.m.eaton@us.army.mil.

CARYN L. DUCHESENEAU, CIP
Chief, Human Subjects Protection Review
Human Research Protection Office
Office of Research Protections
U.S. Army Medical Research and Materiel Command

Note: The official copy of this approval memo is housed with the protocol file at the Office of Research Protections, Human Research Protections Office, 504 Scott Street, Fort Detrick, MD 21702. Signed copies will be provided upon request.

Classification: UNCLASSIFIED
Caveats: NONE
April 2008 - H.O.P.E Project Information for Liberty Dialysis Patients

We would like to tell you about a new research project that may be of benefit to you and, if the project is successful, will help dialysis patients in the future. The H.O.P.E. Project’s goal is to improve the quality of life for dialysis patients and their caregivers and to reduce the number of times you are admitted to a hospital or go to an emergency room by providing additional health support at home.

This is a voluntary project – no one is required to be part of it. Qualifying individuals will be placed into one of three groups:

- Home Health Aide Group – will have home visits by a Health Aide
- Tele-medicine Group – will be provided a home monitor and will be able to communicate with a research nurse via the monitor connected to your telephone line
- Control Group who will continue to receive best dialysis care

Information meetings will be held to explain the project in detail and we hope it will interest you enough to volunteer. If you, your family, or caregiver would like more information on this research project, please:

1) Contact me by phone at 547-6208 and leave a message
   OR
2) Complete the information below and return to the Liberty Dialysis H.O.P.E. Project box

Sincerely,

Steven J. Berman, MD

I would like to learn more about participating in the H.O.P.E. Project:

☐ Yes ☐ No

Patient’s Name: ____________________________________________________________

Legally Authorized Representative (if applicable): ____________________________

Patient/Legally Authorized Representative Telephone #: _____________________
SF-36 HEALTH SURVEY

SF-36 Health Survey
(also known as the Medical Outcome Study (MOS) 36-item short from health survey)

AUTHOR: John E. Ware, Jr.
PURPOSE: The SF-36 Health Survey is a generic outcome measure designed to examine a person’s perceived health status

DESCRIPTION: The SF-36 is a 36-item, easily scored and administered measure assessing 8 health concepts:

1. physical functioning (PF);
2. role limitations because of physical health problems (RP);
3. bodily pain (BP);
4. general health (GH);
5. vitality (VT);
6. social functioning (SF);
7. role limitations because of emotional problems (RE); and
8. mental health (MH).

The SF-36 also includes a single-item measure of health transition or change. The SF-36 can also be divided into two aggregate summary measures the Physical Component Summary (PCS) and the Mental Component Summary (MCS). In the standard version of the SF-36 all scale questions refer to a 4 week time period. Administration time is 5-10 minutes.

NORMS: Based on a national urban sample of adults (N = 2474), the means and standard deviations for the PF, RP, BP, GH, VT, SF, RE, and MH were 84.15 (23.28), 80.96 (34.0), 75.15 (23.69), 71.95 (20.34), 60.86 (20.96), 83.28 (22.69), 81.26 (33.04), and 74.74 (18.05) respectively.

SCORING: The SF-36 Health Survey items and scales were constructed using the Likert method of summated ratings. Answers to each question are scored. These scores are then summed to produce raw scale scores for each health concept which are then transformed to a 0-100 scale. Scoring algorithms can then be applied to produce the PCS and MCS scores. (These two summary scores have the major advantage of being norm based. They also have reduced floor and ceiling effects.)

RELIABILITY: For the multi-item scales the alpha coefficients were PF = .94, RP = .89, BP = .88, GH = .83, VT = .87, SF = .63, RE = .81, and MH = .82 in a random sample of the US Population (N = 1692). In a sample of hemodialysis patients, the alpha coefficients were PF = .90, RP = .76, BP = .79, GH = .82, VT = .62, SF = .76, RE = .90, and MH = .67. Internal consistency was similar for a sample of “normal” persons, persons with depression, and for persons with physical health conditions.

VALIDITY: Concurrent validity was evidenced by the correlation between scale scores. There was also criterion validity as established by correlations between MOS scores and education and age. Known-groups validity is illustrated by different scores on the MOS for different samples in poor health compared to the general population.


Your Health in General

Please answer every question. Some questions may look like others, but each one is different. Please take the time to read and answer each question carefully, and mark an X in the one box that best describes your answer. Thank you for completing this survey!

1. In general, would you say your health is:

<table>
<thead>
<tr>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Fair</th>
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2. Compared to one year ago, how would you rate your health in general now?

<table>
<thead>
<tr>
<th>Much better now than one year ago</th>
<th>Somewhat better now than one year ago</th>
<th>About the same as one year ago</th>
<th>Somewhat worse now than one year ago</th>
<th>Much worse now than one year ago</th>
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SF-36v2™ Health Survey © 1996, 2000 by QualityMetric Incorporated and Medical Outcomes Trust — All Rights Reserved
SF-36 is a registered trademark of Medical Outcomes Trust
(SF-36v2 Standard, US Version 2.0)
3. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

<table>
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<th>Yes, limited a lot</th>
<th>Yes, limited a little</th>
<th>No, not limited at all</th>
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</table>

1. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports .................................................. □ 1 ........ □ 2 ........ □ 3

2. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf .......................................................... □ 1 ........ □ 2 ........ □ 3

3. Lifting or carrying groceries .......................................................... □ 1 ........ □ 2 ........ □ 3

4. Climbing several flights of stairs .................................................. □ 1 ........ □ 2 ........ □ 3

5. Climbing one flight of stairs .......................................................... □ 1 ........ □ 2 ........ □ 3

6. Bending, kneeling, or stooping ....................................................... □ 1 ........ □ 2 ........ □ 3

7. Walking more than a mile .............................................................. □ 1 ........ □ 2 ........ □ 3

8. Walking several hundred yards ....................................................... □ 1 ........ □ 2 ........ □ 3

9. Walking one hundred yards .......................................................... □ 1 ........ □ 2 ........ □ 3

10. Bathing or dressing yourself ........................................................ □ 1 ........ □ 2 ........ □ 3
4. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

- Cut down on the **amount of time** you spent on work or other activities. □ 1 □ 2 □ 3 □ 4 □ 5
- Accomplished **less** than you would like. □ 1 □ 2 □ 3 □ 4 □ 5
- Were limited in the **kind** of work or other activities. □ 1 □ 2 □ 3 □ 4 □ 5
- Had **difficulty** performing the work or other activities (for example, it took extra effort). □ 1 □ 2 □ 3 □ 4 □ 5

5. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

- Cut down on the **amount of time** you spent on work or other activities. □ 1 □ 2 □ 3 □ 4 □ 5
- Accomplished **less** than you would like. □ 1 □ 2 □ 3 □ 4 □ 5
- Did work or other activities **less carefully** than usual. □ 1 □ 2 □ 3 □ 4 □ 5

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(SF-36v2 Standard, US Version 2.0)
6. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Quite a bit</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
<tr>
<td>□₁</td>
<td>□₂</td>
<td>□₃</td>
<td>□₄</td>
<td>□₅</td>
</tr>
</tbody>
</table>

7. How much **bodily pain** have you had during the **past 4 weeks**?

<table>
<thead>
<tr>
<th>None</th>
<th>Very mild</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Very Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
<tr>
<td>□₁</td>
<td>□₂</td>
<td>□₃</td>
<td>□₄</td>
<td>□₅</td>
<td>□₆</td>
</tr>
</tbody>
</table>

8. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>A little bit</th>
<th>Moderately</th>
<th>Quite a bit</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
<tr>
<td>□₁</td>
<td>□₂</td>
<td>□₃</td>
<td>□₄</td>
<td>□₅</td>
</tr>
</tbody>
</table>
9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...

<table>
<thead>
<tr>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
</tbody>
</table>

- Did you feel full of life? ........................................... □ 1 □ 2 □ 3 □ 4 □ 5
- Have you been very nervous? ....................................... □ 1 □ 2 □ 3 □ 4 □ 5
- Have you felt so down in the dumps that nothing could cheer you up? .................................................. □ 1 □ 2 □ 3 □ 4 □ 5
- Have you felt calm and peaceful? .................................. □ 1 □ 2 □ 3 □ 4 □ 5
- Did you have a lot of energy? ....................................... □ 1 □ 2 □ 3 □ 4 □ 5
- Have you felt downhearted and depressed? .................... □ 1 □ 2 □ 3 □ 4 □ 5
- Did you feel worn out? ............................................... □ 1 □ 2 □ 3 □ 4 □ 5
- Have you been happy? ................................................... □ 1 □ 2 □ 3 □ 4 □ 5
- Did you feel tired? ..................................................... □ 1 □ 2 □ 3 □ 4 □ 5

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?

<table>
<thead>
<tr>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
</tbody>
</table>

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11. How TRUE or FALSE is each of the following statements for you?

<table>
<thead>
<tr>
<th>Definitely true</th>
<th>Mostly true</th>
<th>Don't know</th>
<th>Mostly false</th>
<th>Definitely false</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
</tbody>
</table>

a. I seem to get sick a little easier than other people.................................................. □1 □2 □3 □4 □5

b. I am as healthy as anybody I know................................................................. □1 □2 □3 □4 □5

c. I expect my health to get worse ........................................................................ □1 □2 □3 □4 □5

d. My health is excellent ...................................................................................... □1 □2 □3 □4 □5

THANK YOU FOR COMPLETING THESE QUESTIONS!
5: Health Utilities Index (HUI)

HEALTH UTILITIES INDEX®

INTERVIEWER-ADMINISTERED QUESTIONNAIRE

(US English - Self-assess)
Not for quotation or distribution without permission. All copies of this questionnaire should include a cover sheet which clearly acknowledges that it is a Health Utilities Index questionnaire developed by Health Utilities Inc. (see prototype attached).

HUI23S2US.40Q

Do not use this questionnaire without written approval from Health Utilities Inc. This questionnaire is one of many HUI® data collection instruments, and may not be the most appropriate for your study.

HEALTH UTILITIES INDEX MARK 2 AND MARK 3 (HUI2/3)

40-ITEM QUESTIONNAIRE FOR INTERVIEWER-ADMINISTERED, SELF-ASSESSED "TWO WEEK" HEALTH STATUS ASSESSMENT

by

WJ Furlong, DH Feeny and GW Torrance
Health Utilities Inc., Dundas ON Canada

August 2004

Permission for use of this document is limited to one study and must be obtained in writing from:
Health Utilities Inc. (HUIInc.)
88 Sydenham Street
Dundas ON, Canada L9H 2V3
Telephone (905) 525-9140, extension 22389 / 22377
Fax (905) 627-7914
furlongb@mcmaster.ca
http://www.healthutilities.com
HEALTH UTILITIES INDEX

Notes to researchers regarding the 40-item questionnaire for interviewer-administered, self-assessed "two week" health status assessment

The attached 40-item interviewer-administered questionnaire has been designed to ask the minimum number of questions, either in-person or by telephone, required to classify a subject's health status according to the classification systems of both Health Utilities Index Mark 2 and Mark 3 (HUI2 and HUI3). Question 41 is not an HUI® question but is included in this questionnaire because it is often useful to collect this information in health status measurement surveys. Please note that respondents are to be encouraged to answer all appropriate questions. “Don’t know” and “Refused” responses result in missing data and you will not be able to calculate the HUI utility scores for respondents with missing answers.

This version of the questionnaire is phrased to elicit responses from a wide variety of subjects, aged 8 years and older, about their health status during the past 2 weeks, from their own perspective. Other versions are available to facilitate administration to proxy respondents (eg., family members and health professionals) and to focus questions on other assessment periods. The "current" health focus is often used in clinical studies and economic evaluations of health care programs, in which the concern is to monitor health changes due to treatment. The "usual" health focus has been used in population health surveys, where short-term illnesses like colds are not the major concern. Please contact HUInc to obtain copies of other versions of the questionnaire.

This questionnaire includes a prototype cover sheet of variables that are typically important for identifying each interview (eg., subject ID number and date). All copies of the questionnaire should be clearly marked as a HUInc. questionnaire.

For further information about the HUI® and to obtain a copy of the algorithm for coding responses from the 40-item interviewer-administered questionnaire, please contact the following (and refer to questionnaire HUI23S2US.40Q: 2002-09):

William (Bill) Furlong
Health Utilities Inc. (HUInc)
88 Sydenham Street, Dundas ON, Canada L9H 2V3

Telephone (905) 525-9140, extension 22389
Fax (905) 627-7914
furlongb@mcmaster.ca
http://www.healthutilities.com
1. Furlong WJ, Feeny DH, Torrance GW. Health Utilities Index: Algorithm for determining Mark 2 (HUI2) / Mark 3 (HUI3) health status classification levels, health states, health-related quality of life scores, and single attribute level utility scores for 40-item interviewer-administered health status questionnaires. Health Utilities Inc., unpublished document; February 1, 1999.
PROTOTYPE COVER SHEET

HUI23S2US.40Q
HEALTH UTILITIES INDEX MARK 2 AND MARK 3 (HUI2/3)
40-ITEM QUESTIONNAIRE FOR
INTERVIEWER-ADMINISTERED, SELF-ASSESSED
“TWO WEEK” HEALTH STATUS ASSESSMENT

STUDY TITLE:__________________________________________________________

ID NUMBER OF
SUBJECT:____________________________________________________________

NAME OF SUBJECT:______________________________________________________

NAME OF INTERVIEWER:_________________________________________________

DATE OF INTERVIEW: _____________________

START TIME: _____________________ a.m./p.m.

END TIME: _____________________ a.m./p.m.

CONFIDENTIAL (when completed)

For office use only:
Name of person who collected completed questionnaire:__________________________

Date completed questionnaire received by office:______________________________

Permission for use of this document is limited to one study
and must be obtained in writing from:
Health Utilities Inc. (HUInc)
88 Sydenham Street
Dundas ON, Canada L9H 2V3
Telephone (905) 525-9140, extension 22389 / 22377
Fax (905) 627-7914
furlongb@mcmaster.ca
The next set of questions ask about various aspects of your health. When answering these questions we would like you to think about your health and your ability to do things on a day-to-day basis, during the past two weeks. To define the 2 week period, please think about what the date was 2 weeks ago and recall the major events that you have experienced during this period. Please focus your answers on your abilities, disabilities and how you have felt during the past 2 weeks.

You may feel that some of these questions do not apply to you, but it is important that we ask the same questions of everyone. Also, a few questions are similar; please excuse the apparent overlap and answer each question independently.

All information you provide is confidential. There are no right or wrong answers; what we want is your opinion about your abilities and feelings.

**Interviewer:**
For each question, read the entire sentence as written on the left-hand side of the page following the question number, emphasizing the underlined words or words in italics, if any. **Do not read** the response options listed down the right-hand margin of the page except if listed as part of the question (e.g., Q26, Q31, etc.). **Do not read** the “Don’t know” and “Refused” responses. Encourage respondents to answer each question to the best of their recollection. The answer given by the respondent to each question should be clearly marked in the circle/box beside the one appropriate answer listed in the right hand margin of the question page.
### VISION

1. **During the past 2 weeks, have you been able to see well enough to read ordinary newsprint without glasses or contact lenses?**
   - Yes ➡️ Go to 4
   - No
   - Don't know
   - Refused

2. **Have you been able to see well enough to read ordinary newsprint with glasses or contact lenses?**
   - Yes ➡️ Go to 4
   - No
   - Don't know / Didn’t wear glasses or contact lenses
   - Refused

3. **During the past 2 weeks, have you been able to see at all?**
   - Yes
   - No ➡️ Go to 6
   - Don't know
   - Refused

4. **During the past 2 weeks, have you been able to see well enough to recognize a friend on the other side of the street without glasses or contact lenses?**
   - Yes ➡️ Go to 6
   - No
   - Don't know
   - Refused

5. **Have you been able to see well enough to recognize a friend on the other side of the street with glasses or contact lenses?**
   - Yes
   - No
   - Don't know / Didn’t wear glasses or contact lenses
   - Refused

### HEARING

6. **During the past 2 weeks, have you been able to hear what is said in a group conversation with at least three other people without a hearing aid?**
   - Yes ➡️ Go to 11
   - No
   - Don't know
   - Refused
7 Have you been able to hear what is said in a group conversation with at least three other people with a hearing aid?
○ Yes → Go to 9
○ No
○ Don't know / Didn’t wear a hearing aid
○ Refused

8 During the past 2 weeks, have you been able to hear at all?
○ Yes
○ No
○ No → Go to 11
○ Don't know
○ Refused

9 During the past 2 weeks, have you been able to hear what is said in a conversation with one other person in a quiet room without a hearing aid?
○ Yes → Go to 11
○ No
○ Don't know
○ Refused

10 Have you been able to hear what is said in a conversation with one other person in a quiet room with a hearing aid?
○ Yes
○ No
○ Don't know / Didn’t wear a hearing aid
○ Refused

SPEECH

11 During the past 2 weeks, have you been able to be understood completely when speaking your own language with people who do not know you?
○ Yes → Go to 16
○ No
○ Don't know
○ Refused

12 Have you been able to be understood partially when speaking with people who do not know you?
○ Yes
○ No
○ Don't know
○ Refused

13 During the past 2 weeks, have you been able to be understood completely when speaking with people who know you well?
○ Yes → Go to 16
○ No
○ Don't know
○ Refused
14. Have you been able to be understood *partially* when speaking with people who know you well?
   - Yes ➞ Go to 16
   - No
   - Don't know
   - Refused

15. During the past 2 weeks, have you been able to speak at all?
   - Yes
   - No
   - Don't know
   - Refused

GETTING AROUND

16. During the past 2 weeks, have you been able to bend, lift, jump and run *without difficulty* and *without help or equipment* of any kind?
   - Yes ➞ Go to 24
   - No
   - Don't know
   - Refused

17. Have you been able to walk around the neighborhood *without difficulty* and *without help or equipment* of any kind?
   - Yes ➞ Go to 24
   - No
   - Don't know
   - Refused

18. Have you been able to walk around the neighborhood *with difficulty* but *without help or equipment* of any kind?
   - Yes ➞ Go to 24
   - No
   - Don't know
   - Refused

19. During the past 2 weeks, have you been able to walk at all?
   - Yes ➞ Go to 22
   - No
   - Don't know
   - Refused

20. Have you needed mechanical support, such as braces or a cane or crutches, to be able to walk around the neighborhood?
   - Yes
   - No
   - Don't know
   - Refused

21. Have you needed the help of another person to walk?
   - Yes
   - No
   - Don't know
   - Refused
<table>
<thead>
<tr>
<th>22</th>
<th>Have you needed a wheelchair to get around the neighborhood?</th>
</tr>
</thead>
</table>
|    | ○ Yes  
|    | ○ No  
|    | ○ Don't know  
|    | ○ Refused  

<table>
<thead>
<tr>
<th>23</th>
<th>Have you needed the help of another person to get around in the wheelchair?</th>
</tr>
</thead>
</table>
|    | ○ Yes  
|    | ○ No  
|    | ○ Don't know  
|    | ○ Refused  

**HANDS AND FINGERS**

<table>
<thead>
<tr>
<th>24</th>
<th>During the past 2 weeks, have you had the full use of both hands and ten fingers?</th>
</tr>
</thead>
</table>
|    | ○ Yes ➔ Go to 28  
|    | ○ No  
|    | ○ Don't know  
|    | ○ Refused  

<table>
<thead>
<tr>
<th>25</th>
<th>Have you needed the help of another person because of limitations in the use of your hands or fingers?</th>
</tr>
</thead>
</table>
|    | ○ Yes ➔ Go to 27  
|    | ○ No  
|    | ○ Don't know  
|    | ○ Refused  

<table>
<thead>
<tr>
<th>26</th>
<th>Have you needed the help of another person with some tasks, most tasks, or all tasks?</th>
</tr>
</thead>
</table>
|    | ○ Some tasks  
|    | ○ Most tasks  
|    | ○ All tasks  
|    | ○ Don't know  
|    | ○ Refused  

<table>
<thead>
<tr>
<th>27</th>
<th>Have you needed special equipment, for example special tools to help with dressing or eating, because of limitations in the use of your hands or fingers?</th>
</tr>
</thead>
</table>
|    | ○ Yes  
|    | ○ No  
|    | ○ Don't know  
|    | ○ Refused  

**SELF-CARE**

<table>
<thead>
<tr>
<th>28</th>
<th>During the past 2 weeks, have you been able to eat, bathe, dress and use the toilet without difficulty?</th>
</tr>
</thead>
</table>
|    | ○ Yes ➔ Go to 31  
|    | ○ No  
|    | ○ Don't know  
|    | ○ Refused  

W81XWH0720064 – Page 37
29. Have you needed the help of another person to eat, bathe, dress or use the toilet?
   - Yes
   - No
   - Don't know
   - Refused

30. Have you needed special equipment or tools to eat, bathe, dress or use the toilet?
   - Yes
   - No
   - Don't know
   - Refused

FEELINGS

31. During the past 2 weeks, have you been feeling happy or unhappy?
   - Happy
   - Unhappy ➔ Go to 33
   - Don't know
   - Refused

32. Would you describe yourself as having felt:
   a) happy and interested in life, or
   b) somewhat happy?
   - a ➔ Go to 34
   - b ➔ Go to 34
   - Don't know
   - Refused

33. Would you describe yourself as having felt:
   a) somewhat unhappy
   b) very unhappy
   c) so unhappy that life is not worthwhile
   - a
   - b
   - c
   - Don't know
   - Refused

34. During the past 2 weeks, did you ever feel fretful, angry, irritable, anxious or depressed?
   - Yes
   - No ➔ Go to 37
   - Don't know
   - Refused

35. How often did you feel fretful, angry, irritable, anxious or depressed:
   rarely, occasionally, often, or almost always?
   - Rarely
   - Occasionally
   - Often
   - Almost always
   - Don't know
36. During the past 2 weeks did you feel extremely fretful, angry, irritable, anxious or depressed; to the point of needing professional help?

- Yes
- No
- Don't know
- Refused

MEMORY

37. How would you describe your ability to remember things, during the past 2 weeks:
- able to remember most things
- somewhat forgetful
- very forgetful
- unable to remember anything at all?

- a
- b
- c
- d
- Don't know
- Refused

THINKING

38. How would you describe your ability to think and solve day to day problems, during the past 2 weeks:
- able to think clearly and solve problems
- had a little difficulty
- had some difficulty
- had a great deal of difficulty
- unable to think or solve problems?

- a
- b
- c
- d
- e
- Don't know
- Refused

PAIN AND DISCOMFORT

39. Have you had any trouble with pain or discomfort, during the past 2 weeks?

- Yes
- No ➔ Go to 41
- Don't know
- Refused

40. How many of your activities, during the past 2 weeks, were limited by pain or discomfort: none, a few, some, most, all?

- None
- A few
- Some
- Most
- All
- Don't know
41 Overall, how would you rate your health during the past 2 weeks?
   (a) excellent
   (b) very good
   (c) good
   (d) fair
   (e) poor

   ○ Refused
   ○ a
   ○ b
   ○ c
   ○ d
   ○ e
   ○ Don't know
   ○ Refused

Thank you. That ends this set of questions.

TIME FINISHED: _______________ a.m. / p.m.
### 6: Curriculum Vitae – Steven J. Berman, MD – Principal Investigator

Provide the following information for the key personnel listed on the budget page.

<table>
<thead>
<tr>
<th>NAME</th>
<th>POSITION TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEVEN JON Berman</td>
<td>PRINCIPAL INVESTIGATOR</td>
</tr>
</tbody>
</table>

**EDUCATION/TRAINING** (Begin with baccalaureate or other initial professional education, such as nursing, and include post-doctoral training).

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (IF APPLICABLE)</th>
<th>YEAR (S)</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornell University, Ithaca, New York</td>
<td>A.B.</td>
<td>1961</td>
<td>Psychology</td>
</tr>
<tr>
<td>University of Buffalo, Buffalo, New York</td>
<td>M.D.</td>
<td>1965</td>
<td>Medicine</td>
</tr>
</tbody>
</table>

**RESEARCH AND PROFESSIONAL EXPERIENCE**: Concluding with present position, list in chronological order, previous employment, experience and honors. Include present membership on any Federal Government public advisory committee. List in chronological order, the titles, all authors and complete references to all publications during the past 3 years and to representative earlier publication pertinent to this application. If the list of publications in the last 3 years exceeds 2 pages, select the most pertinent publications. PAGE LIMITATIONS APPLY. DO NOT EXCEED 3 PAGES FOR THE ENTIRE BIOGRAPHICAL SKETCH PER INVESTIGATOR.

**Positions**

1965 - 1966  Internship, Straight Medicine, Buffalo General Hospital, Buffalo, New York
1966 - 1967  Ward Medical Officer, US Naval Station Hospital, Danang, RVN
1967        Epidemiologist, Preventive Medicine Detachment, III Marine Amphibian Force, Vietnam
1967 - 1969  Project Head, Studies of Acute Infectious Diseases (FUO) in Vietnam, Department of Microbiology, Naval Medical Research Unit-2 (NAMRU-2), Taipei, Taiwan
1969 - 1971  Resident, Internal Medicine, University of Washington, Seattle, Washington
1971        Assistant Professor of Tropical Medicine and Medical Microbiology, University of Hawaii, John A. Burns School of Medicine, Honolulu, Hawaii
1971        Consultant, US Navy Medical Research Unit-2 in acute tropical fevers
1972        Consultant, National Academy of Science, for effects of herbicides on populations in Vietnam
1972        Certified Specialist in Internal Medicine by American Board of Internal Medicine, No. 38155, June 21, 1972
1972        Consultant, World Health Organization, in filariasis
1973        Certified Subspecialist in Infectious Diseases by American Board of Internal Medicine, No. 38155, October 15, 1974
1974        Associate Professor of Medicine, University of Hawaii, John A. Burns School of Medicine, Honolulu, Hawaii
1975        Private Practice, Internal Medicine and Infectious Diseases, Medical Specialty Associates, Inc.
1994        Director of Infection Control and Epidemiology, St. Francis Medical Center, Honolulu, Hawaii
1994        Member of Clinical Affairs Committee, Infectious Disease Society of America
2001 - 2004 Principal Investigator, Renal Database Project, St. Francis Medical Center, Honolulu, Hawaii
Professional Affiliations and Activities

1972  Member, American Society of Microbiology
1972  Member, Hawaii Medical Association
1972  Member, Honolulu County Medical Society
1972  Member, American Medical Association
1997  Member, Society for Healthcare Epidemiology of America (SHEA)

Honors

1972  Fellow, American College of Physicians
1973  Fellow, Infectious Disease Society of America
1984  Internist of the Year 1984, State of Hawaii
1984  President, Hawaii Chapter, American Society of Internal Medicine
2003  Clinician Award, Infectious Disease Society of America

Selected peer-reviewed publications (in chronological order)

Selected peer-reviewed publications (in chronological order), continued


Research Support
Completed: Federal Grant
HMSA Foundation, Velin and Julia Kung Foundation 2001 - 2004
Centers for Disease Control (H75/CCH922284-01)
A database of the complete inpatient hospital and outpatient records of 700 patients was created, and from the analysis of these records and focus groups with patients, their families, dialysis staff and physicians, a plan to decrease the burden of infection in these patients and measure the economic impact of the interventions awaits funding. Role: Principal Investigator