Cancer in the Commonwealth of the Northern Marianas Islands (CNMI)

Abstract: The purpose of this study, funded by the National Cancer Institute, was to document the state of cancer awareness and services in the Commonwealth of the Northern Mariana Islands (CNMI) and to begin to identify cancer-care needs. Findings suggest that cancer is the second-leading cause of death in the CNMI, and that the most prevalent cancers are those that can be prevented and/or cured with early detection and treatment. Key informants identified a number of cancer-related service needs, and an action plan was developed based on three priority areas : 1) developing a cancer registry; 2) increasing resources dedicated to cancer prevention and control programs, and 3) increasing capacity of health professionals and support staff. *Key Words:* Medically underserved area, needs assessment, oncology services, Pacific Islanders, quality of health care, health services research

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Introduction

This paper presents findings from an assessment of cancer awareness and needs in the Commonwealth of the Northern Mariana Islands (CNMI) and priorities for cancer infrastructure development in this jurisdiction. This work was funded by the National Cancer Institute.

History, geography, population of CNMI

The CNMI is located in the northwestern Pacific Ocean, approximately 3,700 miles west of Hawai'i, 1,300 miles southeast of Japan, and 125 miles north of Guam. The CNMI consists of a chain of 14 islands with a total land area of 176.5 square miles spread out over 264,000 square miles of the Pacific Ocean. The population of the CNMI lives primarily on three islands. Saipan, the largest and most populated island, is 12.5 miles long and 5.5 miles wide. The other two populated islands are Tinian and Rota, which lie between Saipan and Guam[1-2].

In the 2000 census, the total population in the CNMI was 69,221, with approximately 90% living in Saipan and 5% each in Tinian and Rota[3]. Local residents are primarily Chamorro (~18,000), with smaller groups of Carolinian (~4000), Palauan (~1600), and Chuukese (~1400). A distinguishing feature of the CNMI is that foreign contract workers from Asia (primarily Chinese and Filipino) comprise over half of the jurisdiction's population (~38,000). These contract laborers work in CNMI's duty-free garment industry. The median age of the population in the CNMI is 28.7 years old, which is greater than most other islands in the U.S.-associated Pacific jurisdictions, in part due to the older age distribution of foreign contract workers in the CNMI. Looking at the entire CNMI population, 28% are age 19 years or under, 41% are age 20-34, 18% are age 35-44, 9% are age 45-54, and 4% are age 55 or older. Females outnumber males, comprising 54% of the population[3].

Among the 14 islands of the CNMI, Saipan and Tinian were the sites of fierce fighting between the U.S. forces and the Japanese during World War II, and these islands currently are home to a number of war memorials. After World War II, the United Nations accorded the U.S. trusteeship authority over CNMI and many other Micronesian islands. The covenant to establish a Commonwealth was signed by President Gerald R. Ford in 1976, and the CNMI constitution was ratified in 1977, followed by the election and installation of the government in 1978[4]. The CNMI's residents (excluding foreign contract workers) are U.S. citizens but do not vote in federal elections and do not pay U.S. taxes. In addition to funds received from the U.S., the economy of the CNMI depends in large part on tourism from Japan, and revenue from tourism has declined significantly in recent years with the downturn of the Japanese economy[1-2].

Health care delivery

The CNMI Department of Public Health is responsible for health services in the CNMI. The Commonwealth Health

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Center is located on Saipan. It is government financed and staffed by 40 government-employed physicians, including physicians certified in internal medicine, pediatrics, obstetrics/gynecology, surgery, anesthesiology, pathology, emergency medicine, nephrology, and radiology. Although there are non-government physicians in private practice in the CNMI, few attend patients in the hospital and most transfer them to the care of a CNMI hospital physician if they need to be hospitalized. The hospital accepts people for acute care regardless of insurance status and ability to pay.

The Department of Public Health also operates several outpatient facilities, providing an estimated 80% of all outpatient health care in the CNMI. Several clinics are physically located at the hospital, including adult clinics (providing internal medicine, surgery, orthopedics, and ear-nose-and-throat services), a women's and children's health clinic, an emergency room, and a walk-in acute-care clinic. The government also supports two smaller peripheral clinics in other parts of Saipan. There is a clinic/small hospital on Tinian and another on Rota; each is staffed by two physicians. There are fewer than ten private-practice physicians in the CNMI, working through approximately five private outpatient clinics. Most of these private-practice physicians limit their practice to patients with private health insurance or patients who pay privately for care because of poor reimbursement by government insurance.

Although there are non-government physicians in private practice in the CNMI, few attend patients in the hospital and most transfer them to the care of a CNMI hospital physician if they need to be hospitalized. The hospital accepts people for acute care regardless of insurance status and ability to pay.

Health insurance is available in the CNMI through several mechanisms. Private health insurance is available for purchase. Government-sponsored health insurance is available for government employees. By law, employers are responsible for the medical expenses for their employees during employment and up to 45 days after job termination, and employers may choose to purchase health insurance for employees or pay for medical care themselves. This law applies to individuals who hire housekeepers and other domestic employees, as well as to the companies that employ foreign contract workers. Although there is a Medicaid program, the federal dollar contribution to Medicaid is capped at a total dollar amount, regardless of the number of people enrolled. Medicare is also available, but due to the small number of older adults in the CNMI (less than 4.4%), it is not a significant source of health insurance coverage.

Complex medical cases that cannot be managed in the CNMI may be referred to a facility outside of the CNMI for care. If a case is approved for off-island care, the medical care is paid for by the patient's health insurance (or by the patient if he/she has no insurance) and the government pays for off-island travel, lodging, and meal stipend. Most of the off-island referrals are to Hawai'i and Guam. Off-island care, especially in Hawai'i, is very expense, and requests to send a patient off-island are carefully considered by a Medical Referral Committee composed of government physicians, the hospital social worker, and hospital administrators. Priority is given to patients with good prognoses. However, budget cuts have resulted in a reduction of available off-island services. Complicating the process, many off-island treatment centers now require patients with government insurance or no insurance to pay for treatment before being accepted for treatment.

Method

The cancer needs assessment was conducted in spring 2003 by faculty and residents affiliated with the Department of Family Practice and Community Medicine, John A. Burn School of Medicine, University of Hawai'i.

Data on cancer mortality and morbidity were compiled from three sources—death certificates, the government health database, and off-island referral records. Death certificates are filed with the Department of Public Health and stored in an electronic database. However, residents originally from other Pacific Islands often return to their home islands for terminal care, and the deaths of residents and contract workers occurring off-island may not be recorded. Studies suggest that 70% of death certificates are incomplete, and lack of autopsies in the CNMI means that causes of death are unverified.

Records for patients referred off island for care are maintained by the government. Hospital records contain the ICD-9 codes and physician narratives describing the reason for medical services and the date of death if it occurred. Data on all inpatient cancer care are captured in the government's healthcare database, as are data from government outpatient clinics and diagnostic facilities. However, other outpatient care is not captured. For example, foreign contract workers receive their preventive and outpatient care from clinics established in their garment factories or from illegal clinics. Often, contract workers with cancer diagnoses choose to return to their home countries for care. Nor does the database include data on patients who receive their care through private-practice clinics.

From these data sources, a master list of cancer cases and cancer deaths was constructed, excluding duplicate, unconfirmed, non-cancer, and benign cancer (e.g., basal cell carcinoma) cases. Looking only at death records, 119 deaths were attributed to cancer in 1997 through 2001. Looking at the government health database (1992-2001), 180 cancer deaths were identified and, of the 119 cancer deaths identified through death records, an additional 35 unduplicated cancer deaths were found. This yielded 215 cancer deaths (180 + 35). Thirty-one (31) cases were coded as "cancer of unknown origin" because of insufficient information upon which to determine origin (e.g. the physician's narrative included the terms metastases, adenocarcinoma, or squamous cancer without reference to the primary site). It is possible that lung cancer and cancer of the central nervous system (CNS) are over-counted as primary cancer sites when, in fact, they could have been sites of metastases. Also, diagnoses of lymphoma, leukemia, and multiple myeloma were inadvertently excluded from the query to the hospital-record database; thus, information about these cancers is based on data from death certificates and referral records only.

Information on services available for cancer prevention, diagnoses, treatment, and tracking was gathered from key informants within the Department of Public Health, the Commonwealth Health Center, and the Commonwealth Cancer Association. Needs were identified by these key informants as well, and these were organized in four categories: data; training; equipment and supplies; and services and programs. From these needs, a list of recommendations was developed by the authors. Needs were prioritized and preliminary planning was done by the Pacific Islander delegates of the Cancer Council of the Pacific Islands in the Republic of the Marshall Islands in August 2003. These plans were further refined, and a strategic action plan was developed in November 2003 at a meeting in Pohnpei, FSM.

Table 1. Leading causes of death in the CNMI, 1997-2001

Cause	N	(%)
Cardiovascular disease	156	(19.1)
Cancer	119	(14.6)
Other	84	(10.3)
Injury/trauma	81	(9.9)
Stroke	72	(8.8)
Unknown	67	(8.2)
Infection	57	(7.0)
Respiratory	39	(4.8)
Diabetes	35	(4.3)
Suicide	34	(4.2)
Liver failure	15	(1.8)
Renal disease	14	(1.7)
Alcohol-related death	12	(1.5)
Prematurity	12	(1.5)
Hepatitis	9	(1.1)
Sudden infant death syndrome	5	(<1)
Tuberculosis	4	(<1)
Total deaths	**815**	**(100.0)**

Findings: mortality and morbidity

Leading causes of death, 1997-2001

For the five-year period 1997 to 2001, there were 815 recorded deaths in the CNMI. The leading cause of death was cardiovascular disease, followed by cancer. When analyzed by gender, cardiovascular disease remained the leading cause of death for both men and women (not shown in table). Cancer was the second-leading cause of death for women and third-leading cause of death for men (after cardiovascular disease and injuries/trauma).

Cancer deaths, 1992-2001

There were 215 identified cancer deaths for the ten-year period 1992 to 2001 (Table 2). The leading cause of cancer death was lung cancer (accounting for 18% of cases), followed by cancer of unknown origin (14%), breast cancer (10%), colon cancer (7%), and cervical cancer (6%). There was little difference in the number of cancer cases in men (112) and women (103). However there were differences by gender by types of cancer leading to death (not shown in table). For men, the five leading causes of cancer death were lung cancer (26%), cancer of unknown origin (14%), head and neck cancer (10%), colon cancer (9%), and liver cancer (9%). Curiously, no deaths from prostate cancer were reported. For women, the leading

Table 2. Cancer deaths in the CNMI, 1992-2001

Cancer source	N	(%)
Lung	39	(18.1)
Cancer of unknown origin	31	(14.4)
Breast	22	(10.2)
Colorectal	14	(7.9)
Cervical	13	(6.0)
Head and neck	13	(6.0)
Stomach	13	(6.0)
Liver	12	(5.6)
Lymphoma/leukemia/blood	11	(5.1)
Central nervous system	9	(4.2)
Pancreatic	8	(3.7)
Uterine	5	(2.3)
Esophageal	4	(1.9)
Gallbladder	4	(1.9)
Renal	4	(1.9)
Bladder	3	(1.4)
Ovarian	3	(1.4)
Skin	3	(1.4)
Soft tissue/sarcoma	2	(<1)
Lip	1	(<1)
Other	1	(<1)
Total cancer deaths	**215**	**(100.0)**

cause of death was breast cancer (21%), followed by cancers of unknown origin (15%), cervical cancer (13%), lung cancer (10%), and lymphoma, leukemia, or other cancer of the blood (6%).

Cancer cases

A total of 550 cases of cancer were observed for the eleven-year period 1991 to 2001 (Table 3). For cancer cases, the most common cancers seen were similar to the leading causes of cancer death, including breast cancer (accounting for 16% of all cases), lung cancer (12%), cervical cancer (11%), cancers of unknown origin (10%), and head and neck cancers (7%). Again, gender differences were seen (not shown in table). Of the 550 cases, 246 were in males; lung cancer was the leading cause of cancer morbidity (accounting for 20% of cases), followed by cancer of unknown origin (12%), head and neck cancers (10%), colorectal cancer (9%), liver cancer (8%), and prostate cancer (7%). Of the 304 cases of cancer in females, 29% were breast cancer, 20% were cervical cancer, 8% were of unknown origin, 7% were uterine cancer, and 5% lung cancer.

Table 3. Cancer cases by type of cancer, CNMI, 1991-2001

Cancer type	N	(%)
Breast	88	(16.0)
Lung	64	(11.6)
Cervical	62	(11.3)
Unknown	53	(9.6)
Head and neck	38	(6.9)
Colorectal	32	(5.8)
Liver	23	(4.2)
Stomach	20	(3.6)
Uterine	20	(3.6)
Lymphoma / leukemia / multiple myeloma	17	(3.1)
Prostate	16	(2.9)
Renal	16	(2.9)
Skin	16	(2.9)
Central nervous system	13	(2.4)
Ovarian	12	(2.2)
Pancreatic	11	(2.0)
Soft tissue/sarcoma	11	(2.0)
Bladder	9	(1.6)
Esophageal	7	(1.3)
Thyroid	7	(1.3)
Gallbladder	4	(<1)
Lip	4	(<1)
Other	4	(<1)
Testicular	3	(<1)
Total cancer cases	**550**	**(100.0)**

Findings: cancer-related services

Administration, planning, and data

The CNMI state health plan has not been revised for 2003. The administration recognizes the importance of cancer as the second-leading cause of death. However, it also recognizes that cardiovascular disease is the leading cause of death, and services related to reducing obesity, hypertension, diabetes, and heart disease are considered of major importance. Also, both the hospital and the government health insurance programs often run deficits, and therefore public health programs often rely on external funding. Key informants reported that public health programming is driven by the agendas of external funding sources, such as the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH).

In 2002, the CNMI legislature approved a $1.74-per-pack "sin tax" on cigarettes, and this is expected to generate $5 million in additional government revenue in 2003. Health officials propose to use $1.5 million dollars for health programs. Outside of this potential source of new funds, there are no expectations of additional funding for programs related to cancer awareness, training, prevention, diagnosis, or treatment programs.

CNMI Hospital personnel have worked to compile hospital and death certificate data on cancer as previously mentioned. Partial funding has been allocated for a CNMI cancer registry. However, at the present time, there is no source of data on cancer cases that is comprehensive (i.e., that includes data from diagnosis through treatment and outcome). Also, lack of staff precludes the review of medical records for accuracy for coding, for resolution of ambiguous or erroneous codes, or for sophisticated data analyses. However, the government health database includes age, gender, race, residence, cause of death, and date of death, so it would be possible for future researchers to conduct analyses.

Public health services

As noted previously, availability of funds remains a primary driver of public health programming. In 2002, CDC and NIH dollars supported public health programs in tobacco prevention, cervical and breast cancer screening, and diabetes. However, in 2003, funding for the cervical and breast cancer screening program was not renewed. The tobacco prevention and cervical/breast cancer screening programs are described in detail below.

Cervical and breast cancer screening program. Breast and cervical cancer remain the first- and second-most prevalent cancers and the first- and third-leading causes of cancer death in women in the CNMI. The cervical and

breast cancer screening program was federally funded in 1996 and began in 1998 to provide free Pap smears and mammograms to medically underserved women. In October 2002, the funding ended, and CNMI was unsuccessful in competing for further funding. During the five years that the program was funded, 1,861 women were enrolled, and 2,172 Pap smears and 536 mammograms were performed. Approximately 1.4% (30) of Pap smears and 5% (27) of mammograms were abnormal. The program overcame significant challenges that include lack of awareness about breast and cervical cancer, distrust of the health care system, loss of privacy in small communities where there are few female physicians, transportation and language barriers, and embarrassment of gynecological exams. Outreach coordinators often use community and family contacts for recruitment and often follow up abnormal test results with home visits.

At this time, local funding supports the salaries of four staff members to continue the program, as well as funds for free Pap smears and mammograms. Women with abnormal findings who require off-island workup or treatment but are not eligible for the Medical Referral Program must pay for care on their own. Since the program targeted uninsured low-income women, many of the women originally enrolled in the program have not continued annual screening because services are no longer free. The loss of external funding for this program has resulted in a significant decrease in breast and cervical cancer screening, which increases the likelihood of a rise in late-stage diagnoses of breast and cervical cancer in the CNMI.

Tobacco Prevention Program. Lung cancer is the leading cause of cancer death and the second-most prevalent cancer in the CNMI. Tobacco is a risk factor for lung cancer, and many adults in the CNMI smoke. Additionally, the 2000 Commonwealth Youth Tobacco Survey (CYTS) found that nearly 55% of middle school and 85% of high school students had tried cigarettes, and that nearly 10% of middle school and 30% of high school students reported smoking in the last 30 days.[5] The CNMI's federally funded Tobacco and Substance Abuse Program, housed in the Division of Mental Health, conducts public education on tobacco prevention through radio announcements, community events and school activities. Laws against selling cigarettes to minors have been passed, and occasionally stores are checked for compliance with this law.

Medical services

Cancer is diagnosed and treated at the government hospital and outpatient clinics, by physicians in private practice, and in off-island facilities. Cancer prevention counseling and screening practices are not standardized among physicians, and cancer screening may not be a priority in physicians' practices in light of concerns about diabetes, which has high prevalence in the CNMI, and heart disease, which is the leading cause of death. Key informants noted that many cancers diagnosed at the Commonwealth Health Center are detected at late stages, and many cancers are believed to go undiagnosed. Contributing to the problem, key informants reported that many private-practice physicians are kept busy conducting annual screening for tuberculosis, HIV, and syphilis of the CNMI's 38,000 foreign contract workers, as required by law. Relaxation of the requirement for annual screenings is being considered, so that private practice physicians can provide more primary care to the local population.

There are no oncologists in the CNMI, although one physician has received training in the management of cancer patients. Diagnostic services such as colposcopy, sigmoidoscopy, colonoscopy, and various tissue biopsies can be performed locally, but interpretation of these biopsies is not locally available. Regarding treatment, non-complicated cancer-related surgeries can be performed in the CNMI. Chemotherapy generally is initiated off-island, but maintenance chemotherapy can be provided by two nurses who attended a three-week chemotherapy training program in Hawai'i in 1996. Patients who needed radiation therapy were previously referred to Guam, but because Guam's radiation facilities were damaged in the 2002 typhoon, patients currently are being referred to Maui or Manila. Patients who require further diagnostic and/or treatment services for cancer are referred off-island.

Laboratory and radiology services

Radiology services for cancer diagnosis include mammogram, ultrasound, and CT-guided biopsies. The hospital laboratory can perform guaiacs and complete blood counts with manual differentials. Other lab tests used in cancer diagnosis, including cancer tumor markers, Pap smears, and biopsy-specimen analysis, are performed by Diagnostic Laboratory Services (DLS) in Hawai'i. The turnaround time for tests sent to Hawai'i is two to three weeks.

Non-Governmental Organization

In 2002, some individuals interested in cancer organized the Commonwealth Cancer Association, which works with American Cancer Society (ACS) but remains an independent organization. This independence is maintained primarily because funds raised in the CNMI for ACS in the past have been sent to the national office, and little has come back to the CNMI.

The Commonwealth Cancer Association supports a paid director who is responsible for cancer prevention education. The organization's goals are to raise aware-

ness about cancer risk factors and cancer prevention, to coordinate peer-support programs for cancer patients, and to raise funds. Key informants felt it would be very helpful if cancer information kits available nationally could be adapted for the CNMI. Such a kit would include standard educational materials and guidelines for cancer outreach.

Findings: cancer-related needs

Data needs

Although the Department of Public Health maintains electronic databases that allow the CNMI to answer some cancer-related research questions, the CNMI does not have a cancer registry. Data staff requested training and technical assistance in developing and maintaining a cancer registry. They also requested training in coding (especially cancer coding) using the *International Classification of Diseases* (ICD) standard, analyzing and interpreting cancer data, and writing reports.

Personnel and training needs

Personnel. Data staff identified a need for additional staff persons to coordinate data collection, to maintain the registry, and to review charts to assure accuracy of data. The CNMI would benefit from increased access to pathology and oncology services.

Training. Physicians requested updates on cancer screening techniques, diagnostic coding, patient education, and cancer management. Nurses requested training in cancer management, including training of two new nurses in maintenance chemotherapy and recertification of the current maintenance chemotherapy nurses. They also requested training in terminal and palliative care, including pain control education for both nurses and physicians. Public health staff requested training on cancer risk factors, cancer education and outreach, cancer risk, and principles of screening and detection.

Needed equipment and supplies

The physicians expressed a need for updated diagnostic equipment and IV pumps for the administration of chemotherapy and analgesia. Patient education materials also are needed, including pamphlets and a monitor and video playback machine to allow patients to view cancer-related videos.

Needed program and services

A top priority for increasing cancer screening is overcoming cultural barriers to discussing cancer. Thus, culturally appropriate programs in cancer education and awareness are needed. The cost of cancer screening tests also remains a significant barrier. Currently, residents without insurance will pay out of pocket for cancer screening services, and residents with government insurance must often pay out-of-pocket for cancer screening services at private clinics. Even though government health facilities must provide treatment regardless of ability to pay, these services are focused primarily on acute care and reducing risk factors associated with diabetes and heart disease. Basic cancer diagnostic services, non-complicated surgical intervention, and maintenance chemotherapy are available, but residents needing other cancer treatments must be referred off-island. This incurs additional acute-care expenditures for CNMI and further limits funding available for prevention activities. The capacity of laboratory services is restricted by limitations in resources and trained personnel.

Recommendations by the Assessment Team

Based on the findings of this report, the assessment team offered five recommendations for improving cancer-related services in the CNMI.

- *Recommendation 1:* Increase public awareness of cancer risk, cancer prevention, and the benefits of early detection and treatment of cancer.
- *Recommendation 2:* Develop and implement a screening program for cancers that can be cured with early detection and treatment. This requires increasing the capacity of health providers to conduct colposcopies, endoscopies, and surgeries, and analyze tissue and biopsy specimens.

Table 4. Action plan for the CNMI's, three cancer-related priority areas

Objectives	Activities
1. Establish a Cancer Registry	Contract with a grant writer to apply for Cancer Registry grant
2. Increase resources dedicated to cancer prevention and control programs	Contract a grant writer to apply for at least two grants
3. Increase capacity of health professionals and support staff	a) Provide training in chemotherapy maintenance for nurses b) Provide continuing training and education for pathologist c) Provide ICD-10 training for data personnel

- *Recommendation 3:* Develop a referral network within Guam so that off-island cancer treatments currently provided in Hawai'i can be provided closer to the CNMI and at lower cost.
- Recommendation 4: Establish a cancer registry, and train staff to maintain it.
- *Recommendation 5:* Educate government and community leaders on the need for resources to develop and maintain a cancer prevention and treatment infrastructure.

Prioritizing and setting objectives

Needs were prioritized and preliminary planning was done by the Pacific Islander delegates of the Pacific Cancer Council in the Republic of the Marshall Islands in August 2003. These plans were further refined, and a strategic action plan was developed in November 2003 at a meeting in Pohnpei, FSM. This group designated three priority areas:

- Establish a cancer registry.
- Increase resources dedicated to cancer prevention and control programs.
- Increase capacity of health professionals and support staff.

The group also developed specific objectives for each priority area. A summary of a one-year action plan for CNMI, which was shared with the National Cancer Institute, is shown in Table 4.

Conclusions

Findings suggest that cancer is the second-leading cause of death in CNMI, and the most prevalent cancers are those that could be prevented and/or cured with early detection and treatment. Key informants requested assistance in developing a cancer registry, increasing resources dedicated to cancer prevention and control programs, and increasing capacity of health professionals and support staff.

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Tuak bwe Elimajnono.
Walk in the trubulent ocean currents between two islands.
Face your challenges.
Marshallese proverb