Bermuda Hospitals Board

Estate Master Plan Review

Phase I. Report

August 24, 2007

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Introduction

Bermuda Hospitals Board (“BHB”) is responsible for the oversight of King Edward VII Memorial Hospital (“KEMH”) and the Mid-Atlantic Wellness Institute (“MAWI”). KEMH is an acute and long-term care facility that provides comprehensive medical care to the population of Bermuda and overseas visitors. MAWI is the only psychiatric facility on Bermuda, and provides comprehensive mental health care and services. Due to the island's geographic isolation and its high standard of living, the local community demands that the scope of healthcare services provided on the island is greater than in a comparable community hospital elsewhere serving a similar population base.

BHB continuously strives to establish KEMH and MAWI as centers of excellence and meet the growing demand for high quality clinical care. While BHB is fortunate to have a committed team of healthcare professionals working in partnership with patients and the community, its facilities do not meet the functional requirements for high-quality clinical care. For this reason, BHB has identified the need for an estate master planning exercise in order to develop a comprehensive vision for BHB’s estates.

BHB engaged Cannon Design, an internationally reputable architectural company, to create a comprehensive Estate Master Plan (“EMP”) for the entire public health system on the island. The EMP was completed in 2004 and 2005 to be used by BHB to implement short- and long-term facilities and infrastructure guidelines that support the clinical responsibilities of BHB and respond to the demand for patient-driven services.

The Cannon Design EMP was comprehensive and covered all architectural, engineering, and other technical aspects, and delivered a highly professional analysis and recommendations regarding the various site options. The EMP document also discussed various key medical and health system organizational

factors and circumstances that would greatly influence future demand for care and consequently the future service profile of KEMH and MAWI.

While the EMP was received with great satisfaction, in October 2006 BHB engaged Johns Hopkins Medicine International ("JHMI") to review and validate (the "Review") the Cannon Design EMP in order to ensure that the appropriate level of diligence was undertaken and that BHB followed appropriate practices before engaging in such a major project with substantial expenditures. BHB asked JHMI to put emphasis in the Review on healthcare utilization and future service level projections, medical programs appropriateness, economical viability, and projects order of costs. Per the specific request of BHB, this independent, third-party Review of the EMP will be completed in two phases:

Phase 1: **Healthcare utilization assessment and future demand projections with particular focus on optimizing the economical sustainability and medical viability of acute clinical services**

Phase 2: **EMP review with particular focus on redevelopment options, and schedule & professional fees comparisons to known benchmarks**

Beyond the above scope, the Review is intended to strengthen relationships among Bermuda healthcare stakeholders, promote greater understanding of industry practice, and support BHB's governance and oversight responsibilities. This document outlines the findings and recommendations of Phase 1 of the Review, which was completed from April through July 2007.

Acknowledgements

The completion of Phase 1 of the Review would not have been possible without the active participation of the members of BHB, the KEMH & MAWI leadership and staff, physicians, Bermuda government officials, many independent organizations and multiple individuals. We truly appreciate their passion towards healthcare on the island and would like to extend our gratitude to all of them for their valuable input.

In particular, we would like to thank to **Mr. David Hill**, CEO of BHB, **Ms. Venetta Symonds**, Deputy CEO of BHB, and **Mr. George Melling**, Director of Facilities of BHB for their continuous guidance and support throughout Phase 1 activities.

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Our team has learned that healthcare system reforms and the KEMH & MAWI facilities redevelopment options are highly debated topics on Bermuda that are not free from passionate opinions and political charges. The academic experts on our team have been conducting their activities with integrity, so we can deliver a truly independent and objective assessment and recommendations to BHB. Finally, we would like to thank to **Mr. Herman Tucker**, Chairman of BHB, and **Mr. Phillip Butterfield**, Chairman of the Bermuda Hospitals Charitable Trust ("BHCT") for their ongoing guidance and support in our interactions with public and political leaders.

Executive Summary

Cannon Design EMP Recommendations

The Cannon Design EMP incorporates reviews of various population, health system, ambulatory care, diagnostic, and inpatient care factors that will influence the future healthcare needs of Bermuda. Based on these reviews, the EMP proposes numerous new services that should be added and modifications to existing service lines that should be developed by BHB. Among those, the following key conclusions and recommendations may influence future inpatient bed needs:

- Aging population
- Separating continuing-care beds from acute care setting

Further, the EMP proposes that the following list of services that are currently performed off-island may be offered at the new acute care hospital:

- Invasive Cardiology
- Cardiac Catheterization Lab
- Special Procedures (Angioplasty Interventional Radiology)
- Lithotripsy
- Neuro-Diagnostics (limited EEG/EMG)
- Sleep Lab
- Radiation Oncology Services (Lin. Acc.)
- Respiratory care (PFT)
- Vascular Lab

In conclusion, the EMP outlines its recommendation for a new facility that houses 150 acute care beds as opposed to the then-current 187. In addition, it proposes

to increase the number of continuing-care beds from 104 to 191, and to add 9 psychiatry beds. The following table is the actual *Table 10.6.* in the *EMP Volume 1*, and it depicts the detailed bed number recommendations.

10. Programme Summary

c. Proposed Bed Need by Service

Inpatient Programme/Service	Existing Beds	Proposed 2020 Beds	Comments
Inpatient Medical Care			
- Medical Care Beds - Curtis	36	56	Proposed may also include 7 Int. Beds and 24 Rehab Beds. (56+7+24 = 87)
- Medical Care Beds - Gordon	37		
Inpatient Surgical Care			
- Surgical Care Beds - Cooper	37	36	
- Surgical Care Beds - Perry	31	---	
Rehab Unit	---	24	Proposed beds may be part of Medical beds. (56+8+24 = 88)
Intensive Care Unit	9	10	**Adjusted from 8 beds to 10 beds. (+2)**
Intermediate Beds	---	8	Proposed beds may be part of Medical beds. (56+8+24 = 88) **(+1)**
Maternal Child Programme			
- Paediatrics - Gosling	15	6	
- Maternity	22	10	2005: 5 LDRs; 11 (9+2 ante)=post-partum; LDRs not in bed count. 2020: 5 LDRs; (8+ 2 ante) = 10 post partum; LDRs not in bed count.
- SCBU / Nursery	---	---	Not included in bed count.
Other			
- Agape (Hospice) - MOVE	12	16	**Adjusted from 12 beds to 16 beds. (+4)**
Total ACUTE Beds	199	166	
Other			
- Psychiatry (currently at SBPH)	25	25	Verify concept: Would this be provided at KEMH?
- Transitional Care (in current count)	---	---	
Total Acute Beds	224	191	
Continuing Care Programme			
- Continuing Care - Upper/Lower	74	134	Existing Upper: 39 beds and Lower: 35 beds. Proposed bed count estimated.
- ARDU (Dementia Unit)	30	57	Proposed bed count estimated.
- Agape (Hospice) - MOVE	0	0	**Adjusted from 12 beds to 16 beds. (+4) MOVED TO ACUTE SETTING.**
Total Continuing Care Beds	104	191	
Mental Health			
- Long-term & Geriatric	42	48	
- Detox Centre	7	10	
- Adult Disability Inpatient Units	55	55	Move into Community
Total Mental Health Beds	104	113	
Total BHB Beds	**432**	**495**	

Note: Actual total bed counts are 407 and 470, respectively. The 25 psychiatry beds are counted twice in the final figures.

Scope of Work

BHB commissioned this Review to perform an objective evaluation and validation of the recommendations of the Cannon Design EMP. Medical appropriateness of existing and potential clinical programs, economical sustainability, as well as benchmarking of Cannon Design conclusions regarding service profile, project schedule and cost are the primary focus areas of the exercise.

During Phase 1, the JHMI team, consisting of internationally renowned experts, obtained detailed information and collected data from healthcare stakeholders, most importantly from BHB and from insurers. The JHMI team assessed current service levels and future demand, medical viability, and the medical suitability of various growth opportunities.

This document discusses fact-based findings within the framework of BHB's long-term goals in healthcare development, so it can be used in support of BHB's strategic decisions regarding estate redevelopment and clinical program strategies. This Phase 1 Review is also intended to engage physicians, hospital staff, and the community in the planning process in order to promote consensus regarding healthcare development strategies.

Phase 2 of the Review, pending BHB's decision to move forward, will analyze and recommend estate redevelopment options, including schedule and project order of cost, based on certain findings of the Cannon Design EMP, the findings of Phase 1, and industry benchmarks. At the completion of Phase 2, JHMI will present to BHB a detailed and comprehensive Final Report with findings, conclusions and recommendations with particular focus on optimizing the economical sustainability and medical viability of healthcare services.

Key Findings

The examination of BHB's inpatient volumes has revealed the following facts:

1. The population of patients that the organization is caring for is heavily tilted toward non-acute patients with fully one-third of the patient days associated with continuing care, hospice, and alternative level of care (ALC) patients.

- Continuing-care patients are those who no longer require the services of an acute facility and are, essentially, long-term care or nursing home patients.
- Hospice patients are terminally ill and are in need of end-of-life care, which can be provided in a variety of settings apart from an acute hospital, including at home using the services of visiting hospice nurses.
- Alternative level of care (ALC) patients refer to those medical and surgical patients whose hospital stay has been extended because of non-clinical circumstances. They do not require the services of an acute facility and have a shorter average length of stay than the continuing-care patients.
- Psychiatric patients are in need of institutionalized care, but several options exist for their geographic placement.
- Acute care patients are those needing the full range of modern inpatient hospital services.

2. In addition, average length of stay for BHB is 17.3 days, including hospice, continuing care, ALC and psychiatry, for the entire inpatient population (inclusive of non-acute cases) and 9.0 days for acute-only cases. This differs from the experience in the U.K., where the average is 6.9 days and Canada where the average is 7.4 days. The comparable benchmark in the U.S. is a very aggressive 5.1 days.

This combination of high length of stay and significant numbers of ALC patients (averaging about 40 patients per day) has major implications for the size of the new acute care hospital.

As will be discussed later, several scenarios for the redevelopment could result in a less expensive facility if these non-acute patients can be accommodated apart from the acute care setting. Therefore, solutions for long-term care and sub-acute care apart from the acute hospital must be investigated.

The analysis of the claim data-sets gathered from the insurers related to off-island care has uncovered the following:

The information obtained from the insurers did not allow for reliable quantitative analysis of the number of off-island cases due to incomplete diagnosis code information. As such, the predominantly qualitative conclusions that were made are limited to trends and to the proportion of off-island care, relative to the care provided at KEMH at the specialty level.

Nevertheless, based on the limited comparative analysis of the CPT (or procedure) codes in the insurer claim data and in the KEMH reports, it is apparent that the overall level of off-island care is significant as compared to the KEMH service levels: substantial proportion of Bermudian patients in general surgery, otolaryngology, cardiac surgery, thoracic surgery, ophthalmology, neurosurgery, urology, orthopedics, and obstetrics / gynecology are receiving care off-island.

The survey of the expatriate population indicated the following:

Should BHB extend its clinical programs into the above identified specialties – and the public perception of clinical quality at the KEMH improves significantly at the same time – there is a clear opportunity for expansion of the KEMH patient base in certain specialties. The survey showed that as many as 40-50 % of expatriates would consider KEMH as their hospital of choice if it were operated by U.S. standards. Considering this result as more conservative than how Bermudians would decide, and extrapolating it to the off-island care levels, there is clearly an

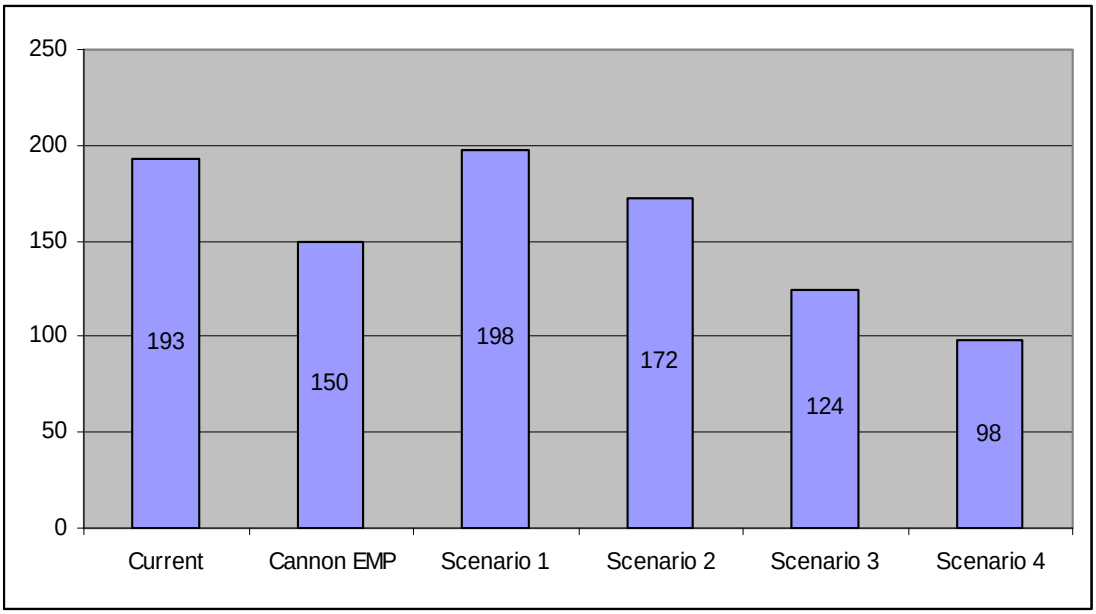
opportunity for BHB to consider strategic programs development in certain specialties.

Proposed Development Scenarios

Our assessment identified multiple issues, such as aging, occupancy rate, patient and insurer preference, non-acute patients, and average length of stay that will have a significant impact on the future infrastructure and facility needs of BHB. These key factors are working independently as well as collectively, and will influence the size, and therefore the cost, of a new facility. Among those, the following two are the most important:

- The appropriate handling of non-acute patients, especially the so-called “alternative level of care,” or ALC patients, and
- The change from a per-diem to a per-case reimbursement system that will allow, but not guarantee, the significant improvement of the average length of stay.

In developing alternative projections for future bed needs, assumptions were made for each of the main factors, which are reflected in four distinct scenarios later in the document. The following table summarizes the key recommendations and consequent acute bed needs under the various assumptions:



Assumptions:

Cannon: Relocate non-acute patients

Scenario 1: Maintenance of the status quo
Scenario 2: Scenario 1 + achieve 85% occupancy rate
Scenario 3: Scenario 2 + reduce length of stay to 6.5 days by removing ALC patients from acute beds
Scenario 4: Scenario 3 + further reduce average length of stay to 5.1 days

Recommendation

The recommendation for the estate master plan is Scenario 3, the development of **124 acute-only beds with an additional shell space for approximately 30 beds.**

Scenario 1 was discarded because it assumed the maintenance of inherent inefficiencies and high health system cost. Scenario 4 is viewed as too aggressive in its assumption of a 5.1 day average length of stay (U.S. benchmark) and was

also discarded. Scenario 2 assumed that the current 9.0 day average length of stay for acute inpatient care would not be reduced, which includes the accommodation of ALC patients in acute beds. This is inappropriate from several perspectives: cost of care, hospital operating efficiency, and clinical appropriateness and safety. Further, it results in the construction of too many costly acute hospital beds; therefore, it too was discarded.

Implementing Scenario 3 will require certain fundamental changes to the Bermuda health system. Most importantly, the reimbursement system must convert to a case-based approach, which encourages efficiency, and ALC patients must be deinstitutionalized. Strategic decisions and collaborative implementation in these areas are the only way the current acute hospital average length of stay of 9.0 days can be reduced to 6.5 days.

In addition, the proposed shell space will allow for potential future growth beyond that envisioned today, provide an opportunity for the hospital to accommodate those citizens of Bermuda who currently obtain their health services off-island, provide future expansion space to accommodate the potential for medical tourism, offer a contingency space for use in the event of an unforeseen disaster and, lastly, allow "swing space" for use in future renovations and modernization of the existing space over time.

While the above outlined approach takes into consideration of all the key factors influencing future needs of the island, it has to be noted that prior to finalizing the estate master plan, critical and strategic decisions will have to be made regarding changes to the reimbursement system, long-term solutions for non-acute care obligation, acute medical care viability, improvement of hospital occupancy and throughput issues. While some of these decisions are related to KEMH operations and therefore can be made by the leadership of BHB, others require an integrated, collaborative approach and must involve the government, insurers and other healthcare stakeholders on Bermuda.

Non-Acute Care

The KEMH campus currently serves patients who would be better served in alternative locations. There are three main types of patients falling into this category: (a) Approximately 40 ALC patients, whose stay has been extended because of non-clinical circumstances, (b) around 8 terminally ill hospice patients who could be better cared for in an alternative setting, and lastly, (c) 101 continuing-care patients whose average length of stay exceeds a year and a half.

Alternative care locations may include nursing homes or assisted-living facilities. Assigning authority for the management of non-acute locations to BHB would allow the balance of critical issues such as capital and operating cost, or clinical and social needs. Finally, it is anticipated that the demand for non-acute beds will grow rapidly in the next ten years, from the current average census of 149 to approximately 200.

Medical Viability

Provided that BHB takes the recommended approach, the balance between sustainable emergency services and a cost-effective, smaller-size community hospital must be established and maintained. The key to the solution is an inclusive and thoughtful health planning process examining the long-term needs of the population, spearheaded by the government and leading towards appropriate health policies and procedures. Consideration must be given to the quality of medical care provided, the safety of patients and the public in general, and the strategic, collaborative stewardship of the health system for the population of Bermuda.

Lacking these policies, procedures, and processes can result in a fragmentation of the delivery system, a rise in overall health care costs due to excessive utilization, a reduction in clinical skill, and deterioration of the health system of Bermuda.

Based on the handling of the issues outlined, which are not entirely within the control of the BHB leadership, different kinds of healthcare facilities will need to be built. However, the resolution of fundamental health system issues, such as the reimbursement system change or the establishment of a safe and sustainable non-acute care system, are prerequisites to the establishment of BHB as the high-quality, cost-effective provider of inpatient care to Bermudians.

Regardless, there is great potential for success for BHB. Its physicians are well-trained and committed, its leadership is energetic and its staff is dedicated to the care of the patients trusted to them. Given new, appropriate and modern facilities, BHB has every chance of succeeding.

Scope of Work

This independent Review has been initiated by BHB to systematically conduct objective and independent evaluations of the findings and recommendations contained within the Cannon Design EMP in order to ensure an appropriate level of diligence in its estate master planning exercise.

Specific emphasis has been requested on economical sustainability, medical viability, medical appropriateness and growth potential when assessing the following primary areas during Phase 1 and Phase 2 of the Review.

Phase 1:

Future demand and service level projections

The JHMI expert team performed a preliminary review of the EMP in October 2006 and recommended that the scope of the contemplated Review be expanded with an initial analysis of healthcare utilization in the community. This recommendation was based on the need for the collection and objective analysis of historical service level data in order to develop reliable and credible future demand projections. These projections consequently could be used to validate the appropriateness and size of the various clinical programs proposed in the EMP. JHMI completed the following as part of Phase 1 of the Review:

- Appraised historical and current service profiles via acquiring and analyzing data from KEMH, insurance companies, physicians, Cannon Design, and other healthcare stakeholders on Bermuda
- Assessed the future demand for health care services, giving consideration to medical, business operational, demographic, cultural, political and other relevant factors
- Identified future service profile alternatives based on multiple scenarios

Medical programs appropriateness – growth opportunities

In addition to the demand analysis, JHMI understood BHB's requirements, health strategies and objectives and evaluated existing, proposed and potential clinical programs. The focus of this exercise was on medical appropriateness and economical viability of the programs that may be provided on the island. This evaluation has been predominantly qualitative and is intended to support BHB in strategic decisions regarding future clinical program development areas.

Cannon Design EMP "gap analysis" for Phase 1

The JHMI team has compared its conclusions regarding bed numbers in Phase 1 against relevant data within the Cannon Design EMP in order to provide a baseline for the contemplated Phase 2 review of the actual hospital redevelopment options. The following table is a summary of the Cannon Design bed number recommendations (please see the detailed table on page 7):

Cannon Design EMP Recommendation		
Number of Beds	*2005 Current*	*2020 Proposed*
Acute care beds (including Alternative Level of Care)	***187***	**150**
Hospice beds	12	16
Continuing-care beds	*104*	191
Psychiatry	*104*	113
TOTAL	***407***	**470**

Phase 2:

Evaluation of the findings and recommendations of the EMP

Phase 2 of the Review will examine and critique in great detail the alternative and recommended replacement options for the acute care hospital based on the findings of Phase 1 and industry benchmarks.

Projects order of costs

JHMI will advise BHB on the construction and project order of costs, review the Architectural and Engineering Professional Services Fee proposal tendered by Cannon Design, and review and evaluate the Project Schedules related to the design component by comparing them to known benchmarks within the Industry.

Finally, this Review is also intended to encourage communication among healthcare stakeholders on Bermuda, promote greater understanding of best practices in healthcare, and support the development of a consensus with regards to the key strategic decisions for KEMH and the healthcare system on the island.

Methodology

JHMI assembled a team of Johns Hopkins School of Medicine, Johns Hopkins Health System, and Johns Hopkins Bloomberg School of Public Health experts in order to complete Phase 1 of the Review. The primary objective of Phase 1 was to establish future service level projection based on the analysis of data collected from all key healthcare stakeholders on the island.

In order to produce fact-based quantitative results, the team collected the following data sets. For the complete list of interviewed organizations and individuals please see ***Attachment A***.

Data set or information	*Source*
BHB historical service level data, 2004-2006 and service level projections, 2007-2012	BHB leadership & staff
Foreign insurance claims, 2004-2006	Argus, BF&M, Colonial, LCCA & HIP
Clinical care integration for various diseases between BHB and physicians	BHB leadership & staff; private practitioners
Healthcare utilization preferences: KEMH vs. off-island	Expatriate community, insurers
2006 Annual Actuarial Report on the Hospital Insurance Plan of the Bermuda Government	Chief Medical Officer
Residential Care Homes and Nursing Care Homes Listing	BHB leadership & staff
Emergency Response Times and Statistics	Bermuda Fire Service
BHB Diabetes Center Annual report	BHB
Ageing in Bermuda	Ravazzin Centre for Social Research in Aging
1992 & 2000 Census	Chief Medical Officer
"Well Bermuda" National Health Promotion Strategy	Chief Medical Officer
Cancer in Bermuda	CHUQ- Laval University Medical Center

BHB Data Analysis

Hopkins experts interviewed the leadership team of BHB, as well as all appropriate department heads and selected physician leaders (e.g., imaging, emergency department, and so on) to determine the current state of affairs as well as the potential for future business growth. Data relative to inpatient volumes (admissions, patient days, length of stay, etc.) by service line (medicine, surgery, etc.) along with outpatient and ancillary service volume were collected from the hospital's information system. An analysis of this data forms the basis of the service profile shown in the following table.

Current Inpatient Volume by Service Line

Patient Days

KEMH	**2005**	**2006**	**2007**
Adult Medical/Surgical/6 South	43,245	46,031	45,632
Pediatrics	2,365	2,202	2,047
Obstetrics/Gynecology	3,084	3,286	3,488
ICU	1,629	1,512	1,411
Total Acute Care	**50,323**	**53,031**	**52,578**
Newborns-Well	1,555	1,544	1,342
Newborns-NICU	1,706	1,620	1,820
Total Newborns	**3,261**	**3,164**	**3,162**
Total with Newborns	**53,584**	**56,195**	**55,740**
Continuing Care Unit	36,947	37,245	36,410
Hospice	2,695	3,028	2,925
Total Non-Acute	**39,642**	**40,273**	**39,335**
Total KEMH	**93,226**	**96,468**	**95,075**
MAWI			
Rehabilitation	5,161	5,528	5,305
Substance Abuse	1,101	930	1,525
Psychiatry - other	25,466	23,619	23,208
Total MAWI	**31,728**	**30,077**	**30,038**
TOTAL BHB	**124,954**	**126,545**	**125,113**

Admissions

KEMH	2005	2006	2007
Adult Medical/Surgical/6 South	4,017	3,940	4,096
Pediatrics	603	532	490
Obstetrics/Gynecology	979	1,067	966
ICU	335	250	269
Total Acute Care	**5,934**	**5,789**	**5,821**
Newborns-Well	522	433	707
Newborns-NICU	303	415	69
Total Newborns	**825**	**848**	**772**
Total with Newborns	**6,759**	**6,637**	**6,593**
Continuing Care Unit	49	54	61
Hospice	74	69	66
Total Non-Acute	**123**	**123**	**127**
Total KEMH	**6,882**	**6,760**	**6,720**
MAWI			
Rehabilitation	36	30	43
Substance Abuse	165	112	182
Psychiatry - other	297	291	300
Total MAWI	**498**	**433**	**525**
TOTAL BHB	**7,380**	**7,193**	**7,245**

Average Length of Stay

KEMH	2005	2006	2007
Adult Medical/Surgical/6 South	10.8	11.7	11.1
Pediatrics	3.9	4.1	4.2
Obstetrics/Gynecology	3.2	3.1	3.6
ICU	4.9	6.0	5.2
Total Acute Care	**8.5**	**9.2**	**9.0**
Newborns-Well	3.0	3.6	1.9
Newborns-NICU	5.6	3.9	26.4
Total Newborns	**4.0**	**3.7**	**4.1**
Total with Newborns	**7.9**	**8.5**	**8.5**
Continuing Care Unit	754.0	689.7	596.9
Hospice	36.4	43.9	44.3
Total Non-Acute	**322.3**	**327.4**	**309.7**
Total KEMH	**13.5**	**14.3**	**14.1**

Average Length of Stay (continued)

MAWI			
Rehabilitation	143.4	184.3	123.4
Substance Abuse	6.7	8.3	8.4
Psychiatry - other	85.7	81.2	77.4
Total MAWI	**63.7**	**69.5**	**57.2**
TOTAL BHB	**16.9**	**17.6**	**17.3**

During the review, little deviation from standard North American clinical practices was observed. It was noted, however, contrary to North American practice, that respiratory therapy services were performed by physical therapists.

Insurance Claims Analysis

Although substantial efforts were made to gather appropriate data from insurers, the type, completeness, and detail-level of the information provided allowed a limited analysis, and therefore, conclusions were limited to trends and to the proportion of off-island care relative to the care provided by BHB at the specialty level. Reliable quantitative analysis of the number of off-island patients (or cases) versus BHB patients by specialty, disease, or procedure was not possible.

The following methodology was used in order to best utilize the data:

To analyze BHB service levels and insurance claims data sets, the team used standard methods that have been used in multiple occasions in numerous countries and have been widely accepted in the public health academic community.

In order to standardize counts of services delivered domestically and abroad, CPT codes and ICD9 or DRG codes were gathered whenever possible from the KEMH & MAWI hospitals and from insurers who handled foreign patient claims. When charge or benefit codes were used in the source data rather than CPT codes,

these were assigned to CPT codes using translation tables provided by the hospital or insurer. These codes covered both conventional physician services as well as inpatient accommodation (room and board).

Once CPT codes had been assigned to all entities in a uniform way, CPT codes were further grouped into more general service type categories using a taxonomy created by the U.S. Centers for Medicare and Medicaid Services (CMS). This taxonomy makes use of physician specialties most often associated with specific services to assign service type categories; for more details, see http://www.cms.hhs.gov/PhysicianFeeSched/ under Utilization File [ZIP, 1.3MB]; the grouping file is taken from the Access database "townhall utilization.mdb".

Current Service Profile

BHB

KEMH is centrally located outside of the city of Hamilton in the parish of Paget, adjacent to the Botanical Gardens. The hospital boasts a diverse nursing and medical staff, recruited locally and worldwide, that provides quality nursing and medical care within the community and uses up-to-date procedures and technological equipment. The hospital at present has 309 beds in private, semi-private, and public wards. Services are organized into five (5) multidisciplinary programs: Continuous Care; Critical Care; Maternal and Child; Medical; and Surgical.

MAWI covers all areas of psychiatry, including acute general adult psychiatry, child and adolescent, rehabilitation, community care, extended care and the psychiatric subspecialties of learning disability and substance misuse. Forensic psychiatric services are provided to the prisons and consult liaison services are provided to the general hospital and social service agencies. The Mid-Atlantic Wellness Institute has been in a mode of deinstitutionalization over the past 20 years, and today has 105 inpatient beds, several community group homes and serves approximately 600 outpatients per year.

While in-depth clinical analysis of the services provided by KEMH was not performed, the medical appropriateness of the existing service lines was assessed. This high-level review revealed that the current primary, secondary and tertiary service profile of the hospital appears to be totally consistent with that of a similarly sized hospital serving a population of approximately 70,000 people. For more details regarding the current service profile, please refer to ***Attachment B***.

The average daily census at BHB is 332 patients, exclusive of newborns. This includes approximately 108 patients in the continuing care and hospice units as

well as approximately 40 patients categorized as ALC – alternative level of care. All three of these categories should be accommodated outside of the acute hospital facility. In addition, psychiatry and substance-abuse programs account for approximately 70 patients per day.

The average length of stay for BHB is 17.3 days, based on 7,245 admissions. A number of anomalies are present in the calculation of average length of stay. For hospice patients, the average day is about a month and a half. For continuing-care patients in 2007, the average length of stay was 1.6 years (down significantly from just over two years in 2005). For psychiatry patients, the average length of stay is nearly 80 days.

Occupancy rates vary from unit to unit with a low of 37% in pediatrics and obstetrics / gynecology and a high of 96% in the continuing care unit. On an overall basis, BHB occupancy is 78% in the most recently completed fiscal year. A more detailed view of current inpatient service volumes is presented in ***Attachment B***.

BHB Inpatient Hospital Volume, including Acute Care, CCU, ALC, Hospice, and Psychiatry

	2005	2006	2007
Inpatient Beds	439	439	439
Admissions	7,380	7,193	7,245
Patient Days	124,954	126,545	125,113
Average Length of Stay	16.9	17.6	17.3
Occupancy Rate	78%	79%	78%
Average Daily Census	342	346	342

Off-Island Care

Many Bermudians and expatriates living on the island travel to the United States, Canada, and United Kingdom for medical care. Some of these patients may stay

on the island for care in the future; hence our team analyzed later in the report the trends and the impact of such conversion. As explained earlier, the type and detail level of the insurers' data did not allow our team to perform a reliable quantitative analysis of the number of off-island patients (or cases) versus KEMH patients by specialty, disease, or procedure. As a result, our conclusions are limited to the proportion of off-island care relative to the care provided at KEMH at the specialty level.

The table on the next page summarizes the number of CPT codes (procedures) that were performed by foreign providers by specialty and by year. The data shows that the overall level of off-island care is significant, particularly in surgical specialties such as cardiac surgery, thoracic surgery, ophthalmology, otolaryngology, neurosurgery, urology, orthopedics, obstetrics / gynecology.

	Argus - Foreign			BFM - Foreign			Colonial - Foreign			LCCA	Total Foreign		
Service Type	2004	2005	2006	2004	2005	2006	2004	2005	2006	2006	2004	2005	2006
Accommodation	26	76	44	145	162	167	2	7	321	5,433	173	245	5,965
General practice/Internal Medicine	18,254	20,217	22,339	2,632	3,895	2,317	6,447	6,517	8,497	1,775	27,333	30,629	34,928
General surgery	752	687	772	89	124	102	273	232	316	174	1,114	1,043	1,364
Allergy/immunology	-	-	4	-	1	-	-	1	-	-	-	2	4
Otolaryngology	110	134	161	26	21	11	25	52	55	21	161	207	248
Anesthesiology	220	119	354	46	91	124	95	94	130	14	361	304	622
Cardiology	677	694	600	87	90	48	304	235	355	144	1,068	1,019	1,147
Dermatology	13	34	36	2	1	2	5	3	4	-	20	38	42
Gynecology (osteopaths only)	4	-	2	1	1	-	-	-	-	1	5	1	3
Gastroenterology	31	43	27	9	3	5	-	-	2	8	40	46	42
Neurology/Neurosurgery	114	141	131	19	17	18	60	77	77	46	193	235	272
Obstetrics/gynecology	61	72	106	7	15	25	30	34	26	7	98	121	164
Ophthalmology	102	124	145	33	31	32	37	28	38	12	172	183	227
Oral Surgery	1	2	7	-	-	1	6	9	-	1	7	11	9
Orthopedic surgery	162	212	165	27	34	35	58	87	93	19	247	333	312
Pathology	-	2	-	-	1	-	-	-	-	-	-	3	-
Plastic and reconstructive surgery	18	23	15	2	8	1	2	2	-	1	22	33	17
Physical medicine and rehabilitation	7	33	13	-	-	-	2	2	3	-	9	35	16
Psychiatry	-	-	38	-	-	8	-	-	-	-	-	-	46
Colorectal surgery	-	1	-	2	-	-	-	-	-	-	2	1	-
Pulmonary disease	9	3	5	1	-	1	-	3	2	-	10	6	8
Thoracic surgery	47	53	20	2	6	5	54	24	27	28	103	83	80
Urology	36	40	46	11	9	7	12	16	24	3	59	65	80
Nuclear medicine	-	1	-	-	-	-	-	1	1	-	-	2	1
Pediatric medicine	58	9	31	9	12	2	24	6	18	-	91	27	51
Nephrology	-	1	-	-	-	-	-	-	-	-	-	1	-
Podiatry	10	7	6	2	-	1	26	17	4	-	38	24	11
Clinical psychologist	1	-	-	-	-	-	-	-	-	-	1	-	-
Diagnostic X-ray/Laboratory/Radiology	10,459	11,558	12,442	449	761	541	1,635	1,991	3,847	149	12,543	14,310	16,979
Vascular surgery	-	1	1	-	-	-	-	-	-	-	-	1	1
Cardiac surgery	7	1	1	1	-	2	-	-	2	-	8	1	5
Hematology	1	2	-	-	2	-	-	-	-	-	1	4	-
Hematology/oncology	1	1	-	-	-	-	-	-	-	-	1	1	-
Emergency medicine	191	252	275	27	30	43	74	64	108	11	292	346	437
Physician assistant	-	2	17	1	23	22	22	1	3	-	23	26	42
Prescribed Drugs	-	-	-	1	-	54	-	1	199	-	1	1	253
Missing/Unassigned	6,424	4,234	4,266	246	492	383	969	1,077	2,437	301	7,639	5,803	7,387

Future Service Profile

Key Determining Factors

The BHB inpatient service level projections described later in this section were developed based on historical data provided by BHB leadership and based on specific assumptions regarding key determining factors. The projected inpatient volume can be accommodated in a number of configurations based on several critical decisions that need to be made. The cost differences in these configurations can be significant. The following are the key issues:

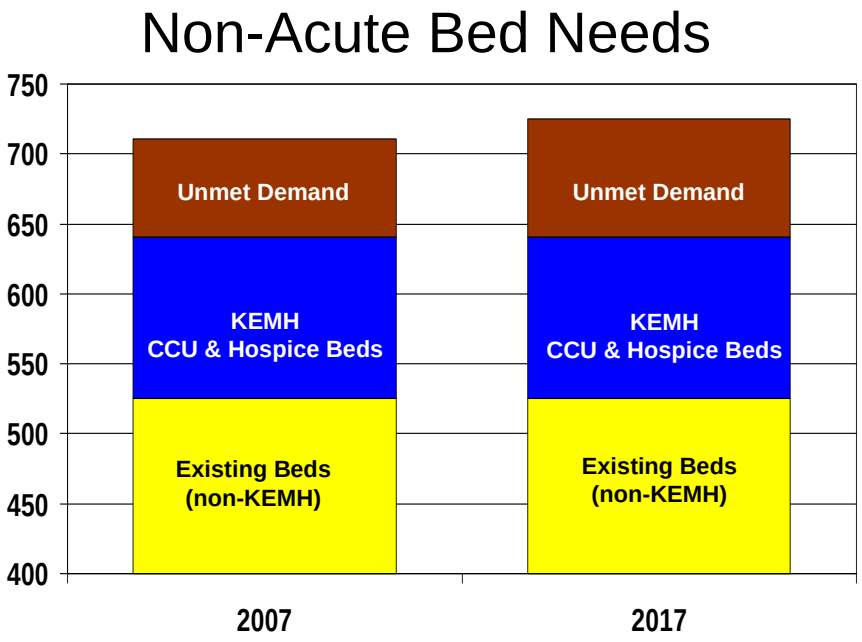
- The handling of non-acute, i.e. continuing care, hospice, and ALC patients separate from the acute-care setting;
- Changes to the reimbursement system from per diem to per case;
- Decreasing average length of stay;
- Improving occupancy rate;
- Aging trends; and
- Patient and insurer preferences.

Non-Acute Patients

(a) Continuing-Care Patients

At present, the KEMH campus is home to approximately 100 continuing-care patients (2007 census data) with an average length of stay approximating 1.6 years. These patients do not need to be accommodated in a new acute-care facility. Care is currently provided in an annex. From any system perspective, it would be far preferable for these patients to be cared for in settings such as nursing homes, rest homes, or assisted living facilities, rather than KEMH.

Currently, and apart from the beds at KEMH, Bermuda has approximately 525 beds associated with long-term care consisting of independent living, private homes, and parish rest home settings. This number is insufficient to handle the current demand (inclusive of the KEMH patients) or the demand that will arise as a result of the aging of the population. The following table illustrates the projected growth of the need for non-acute services.



The yellow area represents the existing elderly and nursing home beds on the island totaling to 525 beds. The blue area reflects the beds that are currently managed by BHB (149). The brown area shows the current and projected demand for non-acute beds, on top of the existing capacity.

The issue of continuing-care patients, however, goes well beyond the walls of KEMH. The approach to long-term care must be dealt with globally and must take into account existing and potential future capacity to care for such patients, patient safety, human and other resource requirements, cost and reimbursement considerations, plus cultural considerations and public opinion. A systemic approach to services provision for continuing-care patients should include the following.

Geriatric assessment services: Utilizing the expertise of physicians trained in geriatrics, assessment services identified issues which, if dealt with aggressively and early, can prevent physical deterioration and postpone institutionalization.

Home care services: In order to keep the elderly active in the community, home care services are often provided as a means of bringing care to patients without having to take the patient to the institution. This builds on the fact that some patients are less mobile than the rest of the population. By bringing services such as physician visits, meals, medications and physical therapy, for example, to patients, the potential for and admission to a long-term care for some is postponed, thus reducing demand for such beds.

Respite care services: Often, family members care for the elderly on a 24-hour basis. While this keeps the elderly from being institutionalized, it provides a heavy burden on the caregivers. Respite care is an approach that allows caregivers to take some well-earned time off from caring for the elderly. The respite can involve day care that allows the family caregivers to take an afternoon off, go shopping, or refresh themselves in other ways before resuming care for the elderly relative. It can also involve one or two days of care, or perhaps even a week or two that allows the family caregivers sufficient time to take a well-earned vacation from their elder-care responsibilities.

Adult day care or day hospital setting: As the name implies, this service cares for the elderly during the daytime while family caregivers are at work; again, avoiding institutionalized care.

Institutionalized care: While typically thought of as nursing home beds, institutionalized care can include such settings as independent living, assisted living, rest homes, and so on.

Resources: In order to provide the appropriate levels of care, the services of caregivers trained in geriatric medicine will be essential. These include physicians, nurses and other providers.

(b) Hospice Patients

Each year, BHB cares for between 60 and 70 patients who are terminally ill and in need of hospice care. Typically, these patients are institutionalized for about a month and a half. This group of patients might also benefit from an alternative setting (home care under the supervision of a visiting hospice nurse, for example) rather than being accommodated on the KEMH campus.

(c) Alternative Level of Care (ALC) Patients

Alternative level of care (ALC) patients have lengths of stay measured in months rather than days and do not require the services of an acute facility. They are, to some degree, social admissions. The significance of their high length of stay (approximately 125 days) coupled with the volume of such patients (approximately 40 at any one time) compromises the throughput ability of the hospital for the remaining acute patients. Accommodating these patients in high-cost new construction will be expensive. Efforts should be devoted to either finding an alternative, low-cost location or developing approaches to their care needs that preclude institutionalization.

The Reimbursement Scheme

The current system in use on Bermuda for reimbursing providers for health services does not provide any incentives for efficiency in caring for patients. In fact, it provides disincentives to efficiency. Inpatient care, for example, is reimbursed on a per-diem basis. Such reimbursement schemes incentivize providers to keep patients institutionalized for a longer period of time. Because

the final days of a patient's stay are far less expensive, keeping the patient for several extra days provides more revenue payments that are disproportionate to the costs incurred. Many developed countries have converted their reimbursement systems from per-diem to per-case reimbursement, which provides incentives for efficiency by paying a flat amount for each case (adjusted, of course, for differences in diagnosis) regardless of how long the patient is institutionalized. The incentive to the provider is to get the patient out of the hospital as quickly as possible, thus reducing the cost of care.

The problems with Bermuda's reimbursement system are not isolated to hospital care alone. Procedures performed in hospital are often reimbursed at higher rates then if performed in a physician's office. In some cases, they are not reimbursed at all. The care provided to continuing-care patients is paid for if it is provided in the hospital, but not if it is provided in an alternative setting such as a rest home.

The emphasis of the reimbursement system should be on "what" has happened has opposed to "where" it has happened.

Because of this, it is proposed to change the hospital payment system from a per-diem to a per-case system. First, this transformation has occurred in over 40 countries around the world and in all 50 of the United States. The transformation began in 1983 when the Medicare program in the United States (the program for aged, disabled and people in end-stage renal disease) shifted to a per-case system based on diagnosis related groups or DRGs. It became known as the Medicare Prospective Payment System. The rationale for the change was to reduce the average length of stay and reduce the number of services being offered to Medicare beneficiaries to an amount that was clinically appropriate. The previous system encouraged hospitals and doctors to keep the patient in the hospital longer than was clinically appropriate and to provide more tests than was clinically appropriate for financial reasons. Evaluations of the program showed

dramatic and nearly instantaneous decreases in average length of stay and a more gradual reduction in unnecessary and clinically inappropriate tests. The evaluations also showed an increased demand for post-hospital care. Patients discharged from the hospital earlier needed additional services at home.

Within two years of the implementation of the Medicare Prospective Payment System, all 50 states adopted some version of a per-case payment system based on DRGs. These state programs achieved similar reduction in length of stay and unnecessary testing without any adverse health impacts.

Beginning in 1987, countries began adopting per-case payment systems for the same reasons that the United States implemented per-case systems – they wanted hospitals to become more efficient and reduce average length of stay. Countries as diverse as Australia, Russia and Chile were some of the first adopters. More recently, Germany and China have implemented per-case payment systems. Each country was starting from a slightly different place. Some countries had per-diem systems (e.g. Germany); others used budgets (Russia), while others paid charges (Chile). Each country had its own reasons for changing to a per-case system.

The advantage that each country experienced was increased productivity in the hospital sector. The hospital was given greater autonomy to practice medicine in the most cost-effective manner possible. As a result, length of stay declined in every instance and the number of tests, procedures and personnel declined. All the countries have maintained the per-case system after it was implemented.

There are three potential difficulties in implementing a per-case system. The first is technical. It is necessary to develop a classification system for grouping patients. Most countries use the Australian groupers and that is the recommendation of the Hopkins group. In addition, the information systems need to be enacted so that clinical information can be sent to the insurers, and the

insurers and the hospitals need to determine the appropriate payment for each case.

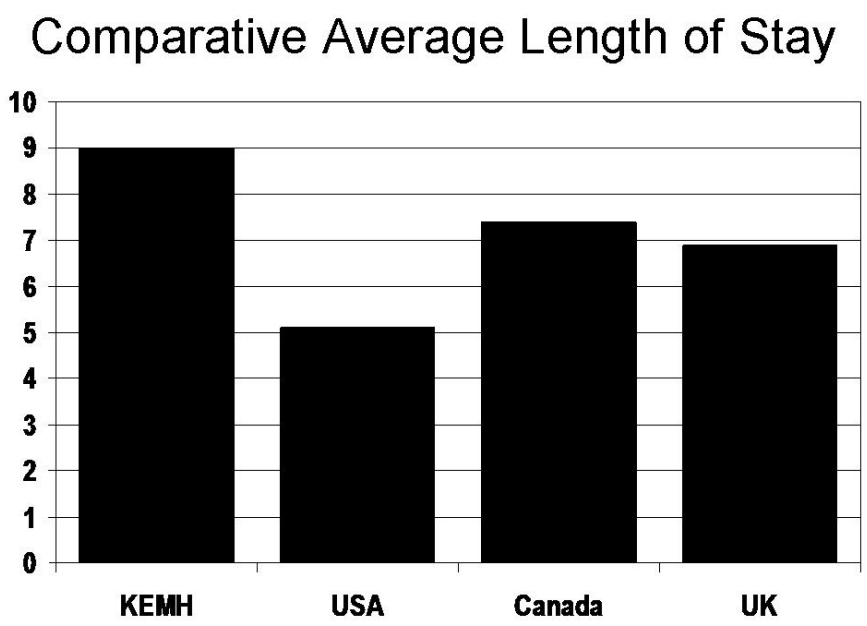
The second is managerial. Hospital departments need to learn to work interdependently in order to operate under a per-case system. This requires hospital managers and physicians to work more cooperatively to manage a patient. It also means that the hospital must learn to manage the resources based on the number and type of patients being treated.

The third is the post-acute case. Patients will be discharged sicker than previously and therefore will need home health and nursing home care. Many countries, including the United States, did not anticipate this issue.

Finally, in order to change the reimbursement system on Bermuda, it will be necessary for all payers and the government to agree to a uniform approach. Such a change is not likely to occur very quickly, but if implemented properly, can result in cost savings to the insurers and the government of Bermuda as the hospital becomes more efficient, plus better outcomes and shorter lengths of stay for patients and an overall improvement in health care efficiency for the people of Bermuda.

Average Length of Stay

Historically, the average length of stay (ALOS) in a hospital has often been treated as an indicator of efficiency. All other things being equal, a shorter stay will reduce the cost of care per episode. Length of stay, however, should only be used with caution as a measure of efficiency. Shorter lengths of stay tend to be more service intensive and thus more costly per day. In addition, if the stay is too short, there may be adverse consequences with respect to health outcomes, as well as issues of comfort and recovery for the patient. If a falling length of stay leads to a rising readmission rate, cost per episode of illness may actually rise.



At KEMH, the current average length of stay for all cases, including continuing care and hospice is 17.3 days (Fiscal Year 2007). The breakdown is as follows:

- Acute Medical / Surgical 9.0 days
- Psychiatry 57.2 days
- Continuing Care 596.9 days (1.6 years)
- Hospice 44.3 days
- Overall 17.3 days

By comparison, the average length of stay for acute medical / surgical patients in the United States, the United Kingdom, and Canada has declined in recent years. In Canada, the average length of stay for such patients is 7.4 days. In United Kingdom, it is 6.9 days, down significantly from 9.2 days in 1990. In the U.S., the average is 5.1 days. Such a discrepancy in average length of stay at KEMH has significant implications both clinically and operationally.

Clinically, it puts the healthcare system at odds with current best practice literature, which is universally associated with significantly shorter average lengths of stay. The available literature related to treatment pathways for clinical

care bundles is almost entirely based on a shorter length of stay, which results in less exposure for the patient to the risks associated with hospital care.

Operationally, the long average length of stay is encouraged by the existing reimbursement system, which pays more for long stays than for short-stay cases. Compounding this inefficient system is the proportion of ALC patients, which represent approximately one third of the hospital's cases; functioning much like a cork on the end of a pipe that makes it difficult to push water through the pipe. Lastly, the length of stay is affected to some degree by the inefficiencies of the patient flow in the current facility.

There are risks associated with the aggressive management of length of stay. Given the local culture, lifestyle and work conditions, patients, and especially their families, expect the patient to remain hospitalized. Further, some physicians are accustomed to keeping their patients in the hospital for longer than it is medically necessary. They all may resist efforts to reduce length of stay, which can have a deleterious effect on outcomes. On the other hand, however, failure to deal with the length of stay issue will necessitate the construction of additional beds to accommodate the same number of patients. It should be pointed out that comparative lengths of stay are constantly being revised downward as hospital care changes over time.

A number of strategies can be employed by the hospital to help reduce length of stay. Quality assurance nurses and case managers, specially trained to monitor patient progress, can be used to keep track of patient-care activities and alert physicians when modifications are needed. Clinical pathways, sometimes referred to as protocols, can be used to specify actions to be taken each day during a patient's hospitalization. These can be developed specifically for KEMH by KEMH staff and physicians, taking into account global best practices experiences and the culture of the hospital and the island.

Hospitalists, physicians trained in the specialty of hospital care, can have a positive impact on length of stay because their focus is only on the hospital phase of a patient's care. In essence, they are clinical efficiency experts.

Lastly, sound discharge planning can be used to reduce length of stay. Essentially, prior to a patient being admitted to the hospital, a specific plan for discharging the patient is incorporated into the patient care plan.

While the length of time a patient remains in hospital is largely an issue of clinical case management, any number of system-wide issues influences the hospital's and physician's management of the case as well as the location of care. The availability of home care can allow for earlier discharge of patients. Sub-acute facilities (non-acute beds) can be used to transition patients from the hospital to home by allowing earlier discharge. The reimbursement scheme is heavily tilted towards payment for in-hospital care, as opposed to care rendered in alternative, and often less costly locations. The lack of these types of facilities and services on Bermuda constrains the ability of the hospital and its physicians to discharge patients sooner than the current 9.0 day average.

Occupancy Rate

Currently, KEMH runs at just over 74% occupancy for its acute beds. Achieving a higher occupancy rate – targeted at 85% – would allow the hospital to construct fewer beds as part of its redevelopment effort. The rewards that can accrue to KEMH as a result of increasing the occupancy rate are significant:

1. Reduced construction and associated project costs for a smaller facility;
2. Savings on equipment needs to support a smaller number of beds; and
3. Reduced operating costs due to lower bed-associated staffing.

In order to improve the occupancy rate, several strategies must be employed. First, there must be an emphasis on throughput management – similar to that

employed to reduce length of stay. Throughput management seeks to maximize the effective use of all of the beds at the hospital's disposal. Strategies that maximize throughput include the use of hospitalists, clinical pathways, information systems, and appropriate balancing of department versus hospital-wide efficiency.

In short, many of the same techniques and strategies used to reduce length of stay can also have an impact on occupancy rate. But operating at an occupancy rate in the 85% range requires a more disciplined approach to the use of the inpatient facility. It means that decisions about patient movement, admission, discharge, and the like must be well-orchestrated, not only within the hospital and its environs, but with those physicians practicing at the hospital as well.

Occupancy rates at KEMH vary widely from service to service, with pediatrics and obstetrics / gynecology experiencing the lowest rates (37% and 43%) and continuing care the highest (96%). Exclusive of continuing-care and hospice patients, the average overall occupancy rate is 74% for acute patients and 78% for psychiatry.

An overall occupancy rate of 85% for acute care was used in determining the number of beds needed to support the planned number of hospital admissions. Given sufficient demand for services, the cost of construction, and the operational efficiencies inherent in new facilities, this level of occupancy is both necessary and achievable. However, it will require the commitment of BHB leadership and its physicians.

Inherent risks are associated with the use of an 85% occupancy rate as opposed to the current 74% rate. First is that the current operational mindset will be unable to deal with the throughput issues associated with higher occupancy. Housekeeping services, for example, will need to adjust cleaning and room

turnover routines. The discharge process will need to be begun earlier in the patient's stay (and perhaps prior to admission) to assure prompt discharge.

The inability to properly orchestrate support and ancillary services can result in back-ups in the ER and operating rooms, delayed admissions, frustration for staff and physicians unable to move patients expeditiously through the hospitalization process, and dissatisfied patients and families.

There are, however, significant offsetting rewards for KEMH:

- Reduced construction and project costs associated with a smaller facility
- Capital savings on equipment needs to support a smaller number of beds
- Potentially reduced ongoing operating costs associated with bed-associated staffing

Current Inpatient Activity

Inpatient Beds

KEMH	2005	2006	2007
Adult Medical/Surgical/6 South	147	147	147
Pediatrics	15	15	15
Obstetrics/Gynecology	22	22	22
ICU	9	9	9
Total Acute Care	**193**	**193**	**193**
Newborns-Well	15	15	15
Newborns-NICU	10	10	10
Total Newborns	**25**	**25**	**25**
Total with Newborns	**218**	**218**	**218**
Continuing Care Unit	104	104	104
Hospice	12	12	12
Total Non-Acute	**116**	**116**	**116**
Total KEMH	**334**	**334**	**334**

Inpatient Beds (continued)

MAWI			
Rehabilitation	18	29	29
Substance Abuse	8	8	8
Psychiatry - other	79	68	68
Total MAWI	**105**	**105**	**105**
TOTAL BHB Inpatient Beds	**439**	**439**	**439**

Average Daily Census

KEMH	2005	2006	2007
Adult Medical/Surgical/6 South	118.5	126.1	124.8
Pediatrics	6.5	6.0	5.6
Obstetrics/Gynecology	8.4	9.0	9.5
ICU	4.5	4.1	3.8
Total Acute Care	**137.9**	**145.2**	**143.7**
Newborns-Well	4.3	4.2	3.6
Newborns-NICU	4.7	4.4	4.9
Total Newborns	**9.0**	**8.6**	**8.5**
Total with Newborns	**146.9**	**153.8**	**152.2**
Continuing Care Unit	101.2	102	99.7
Hospice	7.4	8.3	8.0
Total Non-Acute	**108.6**	**110.3**	**107.7**
Total KEMH	**255.5**	**264.1**	**259.9**
MAWI			
Rehabilitation	14.1	15.1	14.5
Substance Abuse	3.0	2.5	4.1
Psychiatry - other	69.8	64.7	63.5
Total MAWI	**86.9**	**82.3**	**82.1**
TOTAL BHB Inpatient Beds	**342.4**	**346.4**	**342**

Occupancy Rate

KEMH	2005	2006	2007
Adult Medical/Surgical/6 South	81%	86%	85%
Pediatrics	43%	40%	37%
Obstetrics/Gynecology	38%	41%	43%
ICU	50%	46%	42%
Total Acute Care	**71%**	**75%**	**74%**
Newborns-Well	29%	28%	24%
Newborns-NICU	47%	44%	49%
Total Newborns	**36%**	**34%**	**34%**
Total with Newborns	**67%**	**71%**	**70%**
Continuing Care Unit	97%	98%	96%
Hospice	62%	69%	67%
Total Non-Acute	**94%**	**95%**	**93%**
Total KEMH	**76%**	**79%**	**78%**
MAWI			
Rehabilitation	78%	52%	50%
Substance Abuse	38%	31%	51%
Psychiatry - other	88%	95%	93%
Total MAWI	**83%**	**78%**	**78%**
TOTAL BHB Inpatient Beds	**78%**	**79%**	**78%**

Aging

To evaluate the population's aging trend and its potential effect on healthcare demand in the future, the Hopkins team has developed the following estimates for the demand for healthcare services in 2012 and 2017.

The following three sources of information on population trends on Bermuda were used:

- *The 1991 Census of Population and Housing*, Census Office, Hamilton, Bermuda

- *Report on the 2000 Census of Population and Housing*, Census Office, Hamilton, Bermuda
- *Ageing in Bermuda, Meeting the Needs of Seniors*, Irene Gutheil and Roslyn Chernesky, Fordham University, October 2004

The following assumptions were made during the analysis:

- The major assumption is that age and gender utilization rates for hospital services will remain unchanged. In epidemiology and demography, this is the most conservative assumption. It assumes, for example, that if the rate of hospitalization for males age 18-25 is 1.0 per 1000, then the rate will remain at 1.0 per 1000 for the entire time period.
- The impact of changes in race and nativity, religion, education, marital status, or income were not examined. While these factors have been shown to influence utilization rates, the impact is typically much less than age and gender.

Examination of the demographic trends in the 1980-1991 and 1991-2000 time periods show an aging population. It also shows that the population will age rapidly as Bermudians born after 1945 begin to turn age 65 in 2010. The most rapid growth in population occurs in the 65+ population in the 1991-2000 time period for both men and women. The second most rapid rate of growth is in the 45-64 age group in the 1991-2000 time period. In the 1980-1991 time period, there is a large increase in the 30-44 age group. This group will approach age 65 in the 2012-2017 time period. The tables in ***Attachment C*** compare the percentage distribution by age and gender for the 1908-1991,1980-1991 and 1991-2000 periods, respectively:

Applying standard aging adjustments to the demand for hospital services shows that utilization of hospital services will increase by 0.1% to 0.2% per year simply because of population aging. For analysis purposes, the mid-point of the distribution will be 0.15%.

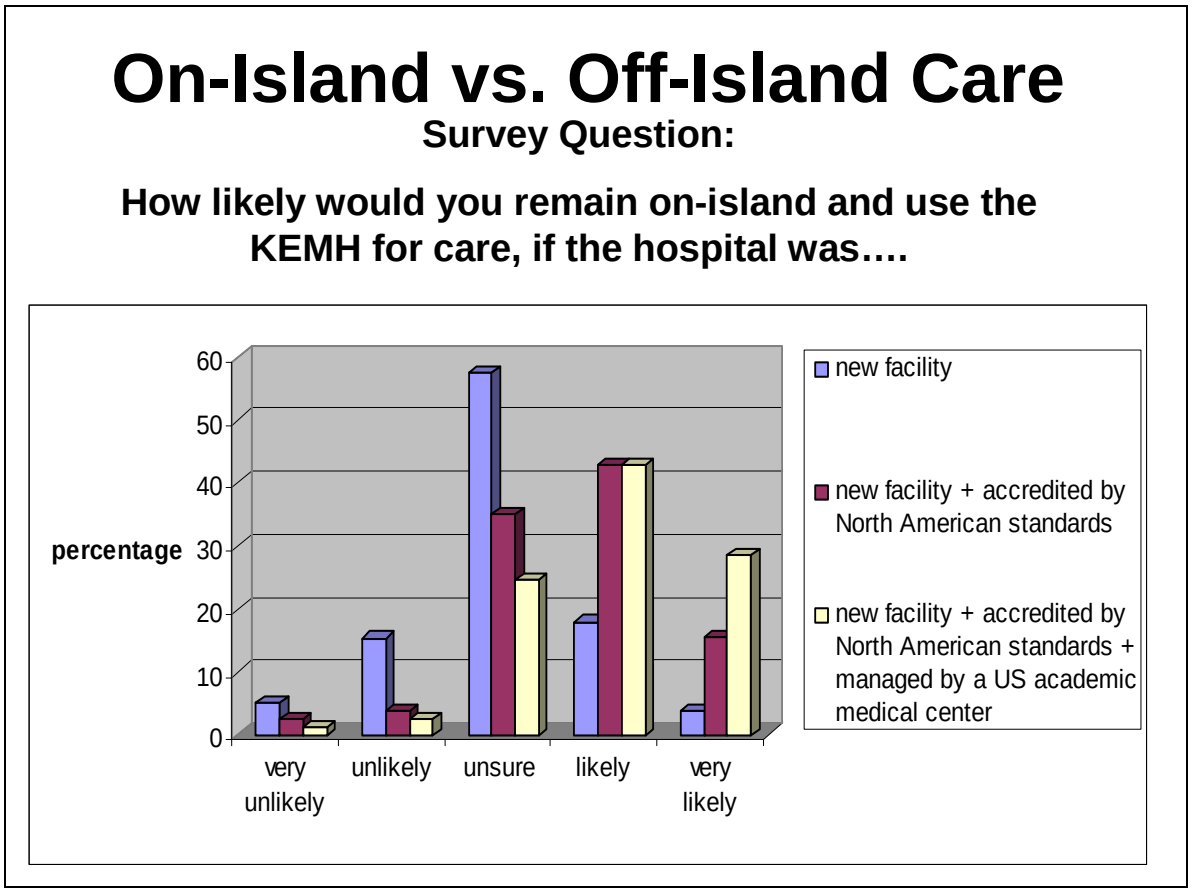
In the 1991-2000 time period, the overall population increased 6%, or 0.66% per year. In the 1980-1991 time period, the overall population increased 8%, or 0.72% per year. This is approximately a 0.7% increase over the entire time period. Combining the population and aging effects suggests a 0.85% increase in hospital utilization per year. Using 2006 as the base utilization rate, the projection is that overall hospital utilization will be 5.2% higher in 2012 and 9.8% higher in 2017.

Patient and Insurer Preference

Historically, many Bermudians and expatriates living on the island have been getting their medical care predominantly in the United States, United Kingdom, and Canada. In order to evaluate this trend, our team performed an online survey of a representative sample of the expatriate population on the island. Based on the sample size of 78 and random selection of survey takers, the results can be extrapolated to the entire expatriate community on Bermuda. Further, using the results of this expatriate survey in determining the probability and extent of patient conversion among Bermudians is an acceptable and conservative approach, as the expatriate perception of local healthcare in general is more conservative than the average Bermudian sentiment. For the entire survey, please see ***Attachment D***.

The survey showed that multiple factors influence the decision of patients when opting for off-island care, including the unavailability of a specialist or the needed procedure, or the perceived quality of care locally. In addition, practitioners on the island have long-established referral relationships with overseas colleagues and hospitals. Should BHB extend its clinical programs into demand areas, and the public perception of clinical quality at KEMH improves significantly at the same time, there is a clear opportunity for expansion of the KEMH patient base in certain specialties. The table below depicts the relevant survey question results

and illustrates the range of the potential conversion within the expatriate community.



Based on the above, between 15%-20% of expatriates would consider KEMH as their hospital of choice if it had a replacement facility. Should the new hospital be operated by U.S. standards, the proportion would go up significantly to 40%-50%. Finally, if KEMH were managed by a reputable U.S. organization, the rate would go up to 60%-70%, which indicates that the majority of the patients would stay on the island for care.

In addition to the above table, the following survey comments support the above conclusions:

“The issue with Bermuda is attracting and retaining good quality medical staff. This is likely to be helped by having a modern facility. However, care should be taken to ensure that staff is kept up to date with the latest techniques.”

“The use of KEMH for care is in my opinion assessed on the basis of the quality of care by the doctors, quality of the facilities & equipment and quality of care by support staff and NOT whether or not it is rebuilt as a new facility.”

“I continue to be amazed that one of the wealthiest countries in the world cannot provide top-notch, world-class medical treatment and attract this level of medical professionals. I continue to hear horror stories relating to misdiagnosis, late diagnosis of serious illnesses that go undetected until pushed to go off island.”

“I think the very important factor in the delivery of good healthcare is the availability and quality of medical personnel – consultants/doctors etc. Machinery/equipment and facilities only complement the activities of the above. It would be very necessary to attract very highly skilled medical personnel…”

“The problem, as I see it, is the quality of the surgeons currently working on the island. With the assistance of my primary physician, I've done everything to treat issues by alternative methods to avoid surgery. If these had failed, it was agreed that a referral to a Canadian hospital would be made - whether insurance covered it or not.”

“My real concern is the level of expertise of the physicians and the nurses. I would always prefer to be treated at a top-quality hospital.”

For qualitative, analytical purposes, the potential conversion rates in the various scenarios were extrapolated on the foreign insurance claim analysis numbers that were, in turn, compared to KEMH levels. Our analysis indicated that as a consequence of potential patient conversion to KEMH, a number of clinical

programs carry significant growth potential on the island. However, limitations on international benchmarks for patient conversion rates under similar circumstances, and the insufficient ICD9 and/or CPT code details within the claim data sets, made specific programmatic projections difficult. In addition, patient conversion will be greatly influenced by other qualitative factors, such as the perceived quality of specialists and medical care in KEMH. The clinical growth potential is evaluated in detail elsewhere in this document.

Psychiatry

Psychiatric patients can be handled several ways: a freestanding facility, a separate but connected facility, or a facility that is fully integrated into KEMH.

A freestanding facility, replacing the current Mid Atlantic Wellness Institute is one approach to providing psychiatric services. On the plus side, such a facility, because it is dedicated to psychiatric care, can maximize the effectiveness of that care and minimize unnecessary acute hospital construction. On the negative side, a totally separate facility may need to build the infrastructure and provide for duplication of certain supportive and ancillary clinical services because they are physically separate from the main facility.

A separate but connected facility has the advantage of keeping psychiatric patients separate from the acute hospital, but takes advantage of economies of size and scale in the provision of infrastructure services (utilities) and support (nutrition, medical records, etc.) and clinical services (labs and other diagnostics).

The final option is the full integration of psychiatric services into KEMH. This is the most expensive and consequently the least preferred of the three options.

Alternative Future Service-Level Projections

The first three of the discussed key determining factors – non-acute care, reimbursement system and length of stay – are significant; each working independently as well as collectively will influence the size and, therefore, the cost of the facility. Because of this, four different scenarios have been developed based on how the three issues are projected to be resolved.

While the accuracy of the historic data cannot be assessed, it does represent a reasonable description of service levels for fiscal years 2005 through 2007. The projections for years 2008 through 2012 are based on this historical data along with interviews with the leadership of BHB, department managers and selected physician leaders. It is thought to provide a sound estimate for assessing inpatient bed needs. The physical condition of the facilities and appropriateness of existing adjacencies have not been assessed, nor have the specific square-footage estimates for the replacement facilities been determined.

In developing the various scenarios for future bed requirements for BHB, a simple Excel®-based bed calculator model was used. First, the model was populated using the number of projected admissions agreed upon by the leadership of BHB and Johns Hopkins. The admissions numbers for acute care, including ALC, hospice care, continuing care (CCU), and psychiatry formed the basis for the various scenarios, which were developed based on different assumptions about average lengths of stay and occupancy rates for the four kinds of patients. Once the input variables (yellow boxes) were entered, the model automatically calculated the values for annual patient days and average daily census (blue boxes), and hospital beds (red boxes).

The primary assumption of 6,568 admissions takes into account the current level of volume at the hospital, slight programmatic growth over time, and the aging of the population.

BHB Bed Calculator Model Template

Variables:	Acute	Hospice	CCU	Psych	Total
Planned Admissions					0
Average Length of Stay					
Target Occupancy Rate					

Calculation of Bed Needs:

Planned Admissions	0	0	0	0	0
Average Length of Stay	0	0	0	0	
Annual Patient Days	0	0	0	0	0
Average Daily Census	0	0	0	0	0
Target Occupancy Rate	0	0	0	0	
Raw Bed Needs	0	0	0	0	0
Total Hospital Beds					

Certain individual assumptions were made about the accommodation of ALC patients, the management of continuing-care demand; the reimbursement system; occupancy rates; and average lengths of stay. These assumptions change from scenario to scenario, which results in significant cost differentials based on the number of beds needed to accommodate the projected patient volume.

Scenario 1

- Continue to accommodate ALC patients in acute beds
- Continue to accommodate the same number of CCU and hospice patients in BHB facilities
- Maintain the current per-diem reimbursement system
- Maintain current occupancy rates and current average lengths of stay

	Acute	Hospice	CCU	Psychiatry	Total
Planned Admissions	5,918	60	65	525	6,568
Average Length of Stay	9.0	44.3	596.9	57.2	17.3
Annual Patient Days	53,262	2,658	38,799	30,030	124,749
Average Daily Census	146	7	106	82	342
Occupancy Rate	74%	67%	96%	78%	78%
Total Hospital Beds	**198**	**11**	**111**	**106**	**426**

Scenario 2

- Scenario 1 plus the following:
- Achieve 85% occupancy rate, except maintain 96% occupancy rate for continuing care

	Acute	Hospice	CCU	Psychiatry	Total
Planned Admissions	5,918	60	65	525	6,568
Average Length of Stay	9.0	44.3	596.9	57.2	17.3
Annual Patient Days	53,262	2,658	38,799	30,030	124,749
Average Daily Census	146	7	106	82	342
Occupancy Rate	85%	85%	96%	85%	88%
Total Hospital Beds	**172**	**9**	**111**	**97**	**389**

Scenario 3

- Scenario 2 plus the following:
- Convert to a case-based reimbursement system to incentivize length of stay reduction
- Reduce current average length of stay to 6.5 days by accommodating ALC patients at locations outside of the acute-care settings
- Continue to accommodate the same number of CCU and hospice patients in BHB facilities but implement a system-wide solution to manage non-acute-care beds and control the demand for non-acute care

	Acute	Hospice	CCU	Psychiatry	Total
Planned Admissions	5,918	60	65	525	6,568
Average Length of Stay	6.5	44.3	596.9	57.2	16.7
Annual Patient Days	38,467	2,658	38,799	30,030	109,954
Average Daily Census	105	7	106	82	301
Occupancy Rate	85%	85%	96%	85%	88%
Total Hospital Beds	**124**	**9**	**111**	**97**	**341**

Scenario 4

- Scenario 3 plus the following:
- Further reduce acute-only length of stay to 5.1 days (US benchmark)

	Acute	Hospice	CCU	Psychiatry	Total
Planned Admissions	5,918	60	65	525	6,568
Average Length of Stay	5.1	44.3	596.9	57.2	15.5
Annual Patient Days	30,182	2,658	38,799	30,030	101,668
Average Daily Census	83	7	106	82	279
Occupancy Rate	85%	85%	96%	85%	88%
Total Hospital Beds	**98**	**9**	**111**	**97**	**315**

Recommendation

The recommendation for the estate master planning initiative is to select Scenario 3, but with the provision for shell space sufficient to accommodate approximately 30 beds included in the new facility. The provision of such shell space will allow for potential future growth beyond that envisioned today, provide an opportunity for the hospital to accommodate those citizens of Bermuda who currently obtained their health services off-island, provide future expansion space to accommodate the potential for medical tourism, offer a contingency space for use in the event of an unforeseen disaster and, lastly, allow "swing space" for use in future renovations and modernization of the existing space over time.

Scenario 1 presumes the maintenance of the status quo with its inherent inefficiencies and high health system cost. For obvious reasons, this scenario was discarded. Scenario 4 is viewed as too aggressive in its assumption of a 5.1 day average length of stay (U.S. benchmark) and was also discarded. The average length of stay assumption underlying Scenario 3 was that the current 9.0-day average length of stay for acute inpatient care would not be reduced. This, however, includes the inappropriate accommodation of ALC patients in acute beds, a situation which is inappropriate from several perspectives: cost of care, hospital operating efficiency, and clinical appropriateness. It results in the building of too many costly acute hospital beds. Thus, Scenario 2 was also discarded.

It is essential to note, however, that in recommending Scenario 3 and the associated shell space, certain changes to the Bermuda health system must be accomplished.

- The reimbursement system must convert from the per-diem approach, which encourages excessive length of stay with its concomitant need for

more beds, to a case-based approach, which encourages efficiency and has been demonstrated to reduce the cost of each encounter.

- The inappropriately accommodated ALC patients, a significant barrier to the efficient use of the hospital's beds, must be dealt with via a strategy to deinstitutionalize. The current acute hospital average length of stay of 9.0 days can be reduced to 6.5 days, better performance than seen in Canada and in the U.K, if these patients can be accommodated in an alternative setting.

Neither of these changes can be accommodated solely by the Bermuda Hospitals Board. They will require the collaborative efforts of the leadership of BHB and the Ministry of Health. Placing residential long-term care facilities in the control of BHB would allow for the appropriate and early placement of patients who no longer need acute hospital services into a facility that is less costly and clinically more appropriate.

The change to the reimbursement system will require both the establishment of appropriate case-based reimbursement rates as well as the acquiescence of the payor community.

If these changes can be accomplished, a new, smaller, more efficiently operated hospital can be constructed, thereby saving construction, equipment, and related project costs and offering the citizens of Bermuda a lower-cost, more clinically appropriate health system.

EMP Gap Analysis

In assessing the appropriateness of the Cannon Design EMP, the Review was limited to an examination of patient volumes and the potential for future bed needs. This Review was based entirely on volume data and estimates for future

volume growth provided by the leadership of BHB and projections of potential future inpatient volume developed jointly by BHB and JHMI.

The following table summarizes and compares current bed numbers by main service areas with the recommendations of the Cannon Design EMP and JHMI for the number of beds in the new facility.

Number of Beds	*Current*	*Cannon Design Recommendation*	*JHMI Recommendation*
Acute Care	**193**	**150**	**124 (+30)**
Hospice Care	**12**	**16**	**9**
Continuing Care	**104**	**191**	**111**
Psychiatry Care	**105**	**113**	**97**
TOTAL	**432**	**470**	**341**

Scenario Risks

A number of critical decisions need to be made as part of this estate master planning effort. While some of these decisions are for the leadership of BHB, others have to do with the system of care on Bermuda. These decisions include the following:

- Will the reimbursement system be changed from per diem to a per-case methodology?
- Will the reimbursement system be modified to pay for services regardless of the location where the services are provided?
- Will the reimbursement system support the growth of ancillary medical services such as long-term care, home care, and the like that are consistent with reducing hospital length of stay?
- Will an alternative location be found for ALC patients?

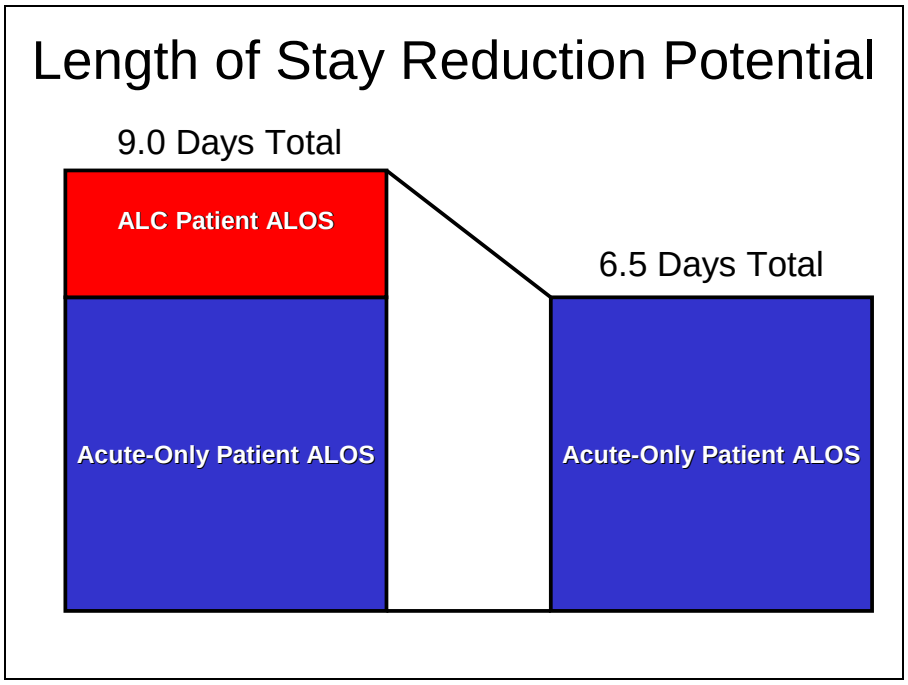
- Will the leadership of the hospital be able to reduce acute average length of stay?
- Will the population accept the notion of shorter hospital stays?
- Can the hospital be operated at 85% occupancy?

Based on the answers to these questions, which are not entirely within the control of BHB leadership, a different kind of facility will need to be built. Regardless, there is great potential for success for BHB. Its physicians are committed, its leadership is energetic and its staff is dedicated to the care of the patients in trusted to them. Given new, appropriate and modern facilities, BHB has every chance of succeeding.

Non-Acute Care

BHB currently provides bed space for 149 non-acute patients. The additional unmet demand is substantial – currently 30 beds – and has been growing steadily. Further, most non-acute patients are served in nursing homes and elderly care facilities, separate from the acute hospital – non-acute patients who are currently served within the KEMH campus would also be better served at alternative locations. These locations should be identified via an organized, system-wide approach.

The most pressing need relates to ALC patients whose hospital stay has been extended because of non-clinical circumstances. They do not require the services of an acute facility and although their numbers are small (an average daily census of approximately 40), their length of stay is such that it increases the entire acute hospital length of stay to 9.0 days. Removing these patients to an alternative location could reduce the acute-only average length of stay to 6.5 days.



The next most pressing need is the group of terminally ill patients who are currently cared for in institutional hospice beds. Numbering about 8 on any given day, they too, could be better cared for in an alternative setting.

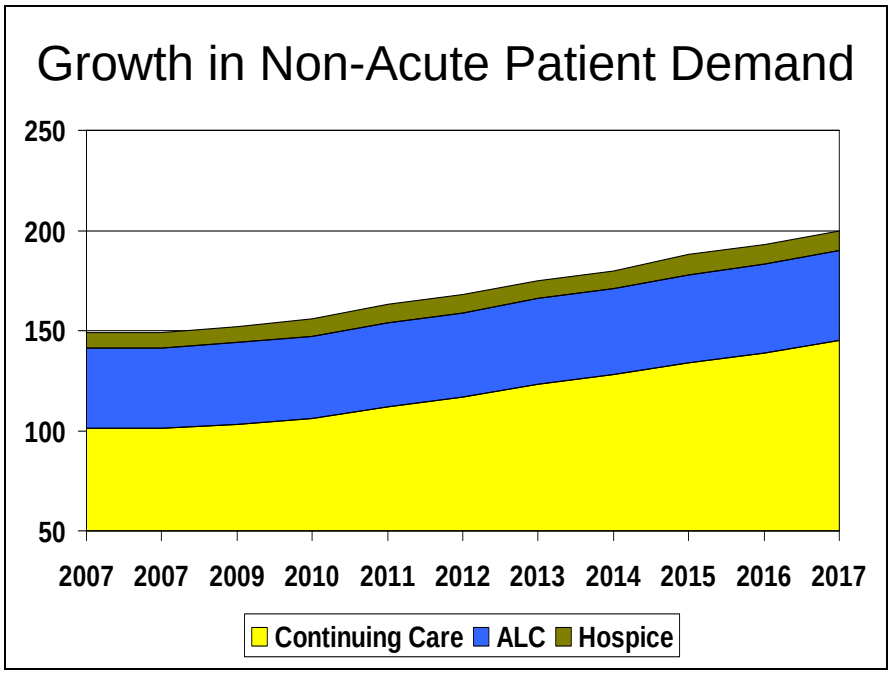
Lastly, there are 101 continuing-care patients whose average length of stay exceeds a year and a half. They could be cared for in a variety of settings apart from the hospital campus. These settings include nursing or rest homes, assisted-living facilities, and even the home given the appropriate community-based support services such as visiting nurses, family respite care, and the like.

While the issues associated with each of these patient types require immediate attention, all three categories must be considered as a single, non-acute patient category and any solution must be developed via a system-wide approach.

One such approach is to assign authority for the management of non-acute beds to BHB leadership. This will allow them to place patients who have come to them for care in the most appropriate setting, which strikes a balance among several

critical issues: operating cost, capital cost for facilities, clinical and social needs of the patient, and overall health system cost.

Another complicating factor is the anticipated growth in demand for non-acute beds. While the average census of all of these patient types is approximately 149 at present, there exists both real current demand (an additional 30 beds) as well as future demand for such services as the population of Bermuda ages. By 2017, it is expected that approximately 200 continuing care, hospice, and ALC patients will need to be accommodated by BHB. A sustainable solution must be developed today if the citizens of Bermuda are to be well served by their health system in the years to come.



Medical Viability

An important issue which must be considered as part of the estate master planning effort is that of medical viability – the ability of the hospital to continue to serve the needs of the citizens of Bermuda. A balance must be struck between the need for emergency hospital-based services (trauma, emergency medical

services, and the like) and a model, cost-effective community hospital (one that is not “overbuilt” in terms of the number of beds and services provided).

Because the issues go beyond the walls of the hospital, striking this balance is the joint responsibility of the Bermuda Hospital Board and the Ministry of Health. The entire health system of Bermuda is involved with this issue. Key to developing the best approach that achieves this balance is the notion of health planning linked to appropriate health policies and procedures. Consideration must be given to the quality of medical care provided, the safety of patients and the public in general, and the strategic, collaborative stewardship of the health system for the population of Bermuda.

In the United States, the various state health departments are responsible for leading collaborative health planning initiatives that examine a wide range of capacity issues, including the numbers of open-heart surgery programs, the availability of mammography services, the number of beds licensed by individual hospitals, and so on. A process known as “certificate of need” is used to manage the capacity of the health system in a way that balances cost, competition, and quality. Competition, per se, can be a very good thing in pressuring hospitals and others to provide the highest quality of care. Too much competition, however, can be detrimental – increasing the cost of care via over-utilization of expensive services. The certificate of need process strikes a balance between too little and too much competition and also seeks to balance supply and demand for health services. On Bermuda, the situation is a bit challenging because there is only one hospital that needs to be large enough to achieve economies of scale in the provision of its services, yet not so large as to incur diseconomies associated with high-cost, excess capacity.

Health regulation, another of the responsibilities of state health departments, has been successfully used to guarantee appropriate levels of reimbursement for services, prevent inappropriate referrals (physicians, for example, are prohibited

from referring patients to private labs in which they have an ownership interest), manage competition (hospital pharmacies are prohibited from competing with community-based drug stores), and assure equitable treatment of all providers.

For the long term, the best approach to assure that appropriate, high-quality, cost-effective services are provided for the citizens of Bermuda is to establish a health planning initiative to examine the long-term needs of the population (including such issues as the aging population, the epidemiology of diseases, population demographics, etc.) determine the best ways to satisfy these needs, develop goals for the health system, and establish the policies, procedures, and processes needed to achieve the goals of the plan.

In the short term, however, appropriate policies, procedures, and processes must be developed to assure medical viability for the hospital. Lacking these policies, procedures, and processes can result in a fragmentation of the delivery system, a rise in overall health care costs due to too much competition and excessive utilization, a reduction in clinical skill, and deterioration in the health system of Bermuda.

Medical Appropriateness and Growth Potential

While the Johns Hopkins team did not perform an in-depth clinical analysis of the services provided by KEMH, it assessed the appropriateness of the clinical service lines, support services, and central services. This high-level review revealed that the current service profile of the hospital appears to be totally consistent with that of a similarly sized hospital serving a population of approximately 70,000 people. A full range of primary and secondary services, along with selected tertiary-care services (emergency medicine and simple trauma care) are provided (for more details regarding the service profile, please refer to ***Attachment B***). Some of the more complex clinical services (cardiac surgery, neurosurgery, etc.), and some elective care with insufficient volume to

support clinical effectiveness, or operational and financial efficiency (transplantation, radiation therapy, and so on), are routinely referred off-island for care.

In reviewing insurance billing data provided by the private insurance payers, several clinical specialty areas of potential growth were identified. These primarily involve patients seeking care off-island who could be enticed to remain on-island for their care if convenient, high-quality clinical services were readily available. A number of clinical services have significant potential for growth. One of the strengths of this analysis is that island-wide procurement of medical insurance data suggests that if BHB focuses on specific areas, the hospital will be able to meet a significant part of the medical demand for many patient services that is currently being served overseas. The implications for the hospital's bottom line are considerable. The following areas have been identified for consideration:

Multidisciplinary Catheterization Laboratory

Although the catheterization laboratory of the future will be multidisciplinary and able to accommodate cardiology, vascular surgery, radiology and other specialties, for illustrative purposes, only cardiology will be focused on here. The retrospective data show that in 2005 and 2006, Bermudians received 678 and 749 diagnostic catheterization procedures on the heart, respectively. This volume justifies the addition of performing diagnostic catheterization procedures on Bermuda.

This volume would easily accommodate the full-time employment of one or even two interventional cardiologists as it far exceeds the 150-200 diagnostic catheterization cases usually required to maintain annual competence. In addition, these numbers can be augmented by an additional 50 cardiac electrophysiology cases per annum that Bermudians received in 2005 and 2006

overseas, which were also catheter-based and performed in a catheterization laboratory.

If any therapeutic procedures, such as coronary angioplasty or stenting, were to be performed, considerably greater requirements (equipment and expertise) would be necessary, especially the need for an on-site cardiac surgery team, a bypass pump perfusionist and so on. Moreover, the data show that only 47 and 59 cases of coronary angioplasty were performed overseas on Bermudians in 2005 and 2006 respectively, as well as only 82 cases each year of open heart surgery. A competent cardiac surgeon would require again approximately 150-200 cases per year to maintain competence. This, coupled with the current small number of angioplasties being performed on Bermudians abroad, would argue that therapeutic coronary cases should still be referred off the island after the appropriate diagnostic procedures are performed.

Finally, although the retrospective nature of these data and the lack of accompanying ICD-9 codes necessitate that they be validated by a larger, prospective analysis, they give some insight to the demand for cardiology services on the island and the medical resources required to meet that need. In addition, as mentioned previously, the catheterization laboratory could also provide additional support (albeit selected cases) for vascular, radiology and other specialties.

Surgical Services in Neurosurgery, Ophthalmology, Urology, and Gynecology Oncology

Neurosurgery: Approximately 70 cases per year were referred off the island in 2005 and 2006 for neurosurgery. Mainly these patients received elective back procedures for lumbar disc problems. Bermuda, however, has unique needs in neurosurgery due to the large volume of head trauma caused by moped and cycle use on the island, which resulted in just over 10 cases per year severe

enough to need care overseas. Although not captured by this data, there are more than likely many other cases of head trauma on Bermuda that would also require an on-site neurosurgeon.

Ophthalmology and Urology: In both ophthalmology and urology, although there are competent physicians in both specialties residing on the island, in 2005 and 2006, approximately 200 cases per year were lost overseas. In ophthalmology, many of these cases were explained by the demand for specialists in retina surgery. On Bermuda, diabetic retinopathy will be an especially acute problem in the future given that the prevalence of diabetes in Blacks is about 18% (12% for Caucasians) and that the prevalence of diabetic retinopathy in Black diabetic patients is about 27% (18% for Caucasian diabetics). In urology, the lack of availability of nerve-sparing prostatectomies precipitated overseas travel to centers of expertise. Although it is perceived that these areas are very much able to grow on Bermuda given the correct expertise, a more thorough, prospective collection of data will be necessary to ensure that the recruitment to the island of specialists capable of performing these tasks would curtail the need for these overseas services.

Gynecological Oncology: Although this service is not performed on the island, our data were not informative on this specialty due to a lack of reliable coding. Since cancer has just replaced heart disease as the number one cause of death in the Western hemisphere, this area will be very interesting for a future prospective study.

The clinical programs discussed above, if implemented, will have the most substantial impact on the inpatient bed needs. In addition to these programs, however, there are other new service line opportunities to consider that will not affect bed numbers or central and support functions greatly. Some of these services make perfect sense to provide on the island and have been pointed out in the EMP as well. These areas should be carefully analyzed and considered by

BHB, conceivably as stand-alone business opportunities. They are ideally suited in a medical retail space or in an ambulatory care setting connected to the acute-care hospital. Such new programs may include the following:

- Special ambulatory procedures (angioplasty interventional radiology)
- Lithotripsy
- Neuro-diagnostics (limited EEG/EMG)
- Sleep laboratory
- Respiratory care (Pulmonary Function Testing)
- Vascular laboratory

Further, in the area of ancillary and outpatient services, rehabilitation services (physical, occupational and speech therapies) can grow substantially. Discussions with the leadership of BHB suggest annual growth of approximately 3% through 2012. However, there is potential for significantly more growth in outpatient therapies either at the hospital or as part of a medical retail operation if the programs can be geographically aggregated to take advantage of their synergy, and if sufficient staff can be recruited and retained.

Similarly, exercise and wellness programs have potential for growth both on their own – attracting those interested in improving their health status – and in conjunction with programs in cardiology, diabetes management, and the like.

Beyond knowing that growth is possible in these areas, it is difficult to predict precisely the level of volume that could be achieved or the specific types of services. This is because, while the insurance company information represents a rich database of claims data, those data were coded using CPT codes (procedurally based coding) as opposed to ICD-9 or DRG identifiers (service line coding), thus making specific programmatic projections impossible. It should be pointed out that the insurance database, while exceptionally rich, is not designed to support service-line growth analysis, but rather support claims processing.

To determine the true untapped demand for services, it will be necessary to capture claims data prospectively and analyze it immediately prior to it being entered into the massive claims database.

Evaluating the specific service areas that may substantially and positively impact the healthcare delivery on the island from medical and feasibility perspectives will allow BHB and KEMH leadership to determine growth focus areas, and design the new hospital accordingly.

Medical Tourism

When considering growth opportunities, programs that will extend the range and quality of clinical services delivered to Bermudians – like the ones described above – should be the first priority to BHB. Further, dealing with the problems of non-acute patients, the reimbursement system, and hospital throughput challenges are required to improve safety and quality of care in the hospital, and in turn attract patients from abroad. Notwithstanding the above, it must be noted that there is future potential for BHB to draw patients predominantly from the U.S. East Coast region in certain areas that offer convenience and the amenities of a resort destination. These include such clinical offerings as plastic surgery, laser vision correction, bariatric surgery, executive physicals, or other routine, short-stay elective surgeries.