



2013-15 MaineGeneral Medical Center

Community Health Needs Assessment

1. Community Health Assessment Service area

The Community Health Assessment conducted in 2013 focused on the MaineGeneral Medical Center service area with a population of approximately 180,000 residents covering 120 square miles living in 82 communities. This population represents 100% of Kennebec County, 87% of Somerset County, 24 % of Waldo County, 20% of Lincoln County, 8% of Sagadahoc County and 3% of the Knox County population. The primary service area (PSA) is defined as the zip codes where MGH has the majority of discharges. The secondary service area (SSA) is defined as zip codes where MGH has 15% or greater, but less than a majority of total discharges. Originating from the mergers and consolidations of several hospitals in central Maine, MGMC is a 287-bed medical center with two campuses in Augusta and Waterville. Services include emergency and critical care, a full range of inpatient and outpatient surgery, diagnostics, substance abuse and mental health services, cancer care, primary and specialty physician offices, maternity newborn and child health programs. MaineGeneral is designated as a nonprofit 501(c)3 organization by the Internal Revenue Service; is accredited by the Joint Commission on Accreditation of Health Care Organizations (JCAHO); and has membership in the American Hospital Association and the Maine Hospital Association. In November 2013, MGMC will consolidate its two inpatient facilities into one new state-of-the-art inpatient facility in Augusta with 192 beds and a renovated state-of-the-art comprehensive outpatient center with a freestanding emergency department in Waterville.

2. CHNA History and Methodology

History:

Prior to the creation of MaineGeneral Medical Center in 1997, the two hospitals were known as Mid-Maine Medical Center in Waterville and Kennebec Valley Medical Center in Augusta. Each had historically collaborated with other community organizations to conduct comprehensive Community Health Needs Assessments to use for planning purposes for health care and prevention services. In 2000, and again in 2010, MaineGeneral Medical Center worked with other hospitals in the state as well as public health partners to complete a community health assessment that utilized secondary and primary data collected via a household survey. In 2005 MGMC conducted an assessment of its primary and secondary service area by contracting with Public Health Resource Group in Portland. This assessment was shared with community stakeholders, and utilized for planning health care services and prevention services in collaboration with community organizations and the public health community.

The 2010 community health assessment process involved the three largest health care systems in Maine including MaineGeneral Health, Eastern Maine Health in Bangor and MaineHealth in Portland coming together to form the OneMaine Health Collaborative. This assessment involved a collaborative two-year planning and implementation process. Community health forums allowing for community review of the data and identification of community priorities were a key part of this statewide needs assessment process. This collaborative way of conducting a statewide CHNA was new to all of the health care, public health and community agency partners, and the results of the assessment were used by each organization to develop new programs and services as well as community health improvement implementation plans.

OneMaine contracted with the University of New England's Center for Community and Public Health (CCPH) to conduct a Statewide Community Health Needs Assessment (CHNA). The assessment, conducted in collaboration with the University of Southern Maine and Market Decisions, Inc., was designed to identify the most important health issues in the state, both overall and by county, using scientifically valid health indicators and comparative information. The assessment also identified priority health issues where better integration of public health and healthcare could improve access, quality, and cost effectiveness of services to residents of Maine. This project represented OneMaine's efforts to share information that could lead to improved health status and quality of care available to Maine residents, while building upon and strengthening Maine's existing infrastructure of services and providers.

The IRS final guidance on CHNA was not available at the time of the data collection in 2010 and dissemination of the CHNA results in 2011. MGMC did identify community health priorities based on the CHNA in 2011 and developed project implementation plans for these priorities, throughout the hospital, health system and collaboratively with community organizations. Due to the new IRS requirements, MaineGeneral decided to conduct a 2013 assessment and create a formal comprehensive community implementation plan for 2013 through 2015.

2013 Methodology

The method used for MaineGeneral's assessment in FY 2013 involved a review of community health trends utilizing secondary data sources from the 2010 Statewide Community Health Assessment (Appendix A); the 2012 State of Maine Public Health Assessment (Appendix B); and primary data collection regarding priorities by stakeholders after they reviewed the 2010 and 2012 data trends (Appendix C). Four strategies were used to select priorities taking into consideration the broad interests of the community MGMC serves.

- 1) MaineGeneral's Prevention Center staff, Public Health personnel and community partners review of the data and selected key priorities and metrics to monitor the impact of interventions.
- 2) Participation in the Central Public Health District review of the 2010 and 2012 data to identify priorities that would be worked on collaboratively within the Central Public Health District as outlined in the 2013 Central District Health Improvement Plan.
- 3) Survey of community stakeholders using an online survey. This included a review of data trends from 2010 and 2012, and the review of selected priorities and goals to be worked on in 2013 through 2015. A survey tool using Survey Monkey was distributed to community stakeholders in the Central Public Health District that includes the towns in MaineGeneral Medical Center's primary and secondary service area. The survey was sent out via an email with a link to the survey tool, along with a data summary of the 2010 CHNA and the 2012 State Community Health Assessment. The stakeholders are members of the Central Public Health District Coordinating Council, as well as a list of participants who participated in the 2010-11 Community Health Assessment forums held collaboratively with the Central Public Health District, MGMC and EMH. Twenty-one stakeholders completed the survey. 33 percent represented nonprofit community organizations, seven percent

represented healthcare (non-physician), 26 percent represented public health, 13 percent represented physicians, 13 percent represented Community Health Coalitions and seven percent represented schools.

Key Findings:

The survey of key stakeholders showed strong support for the proposed priorities. Greater than 75 percent of the survey respondents working on similar goals indicated they were interest in working collaboratively with MaineGeneral. Below is a simple grid showing the highlight of the survey results:

Priority Goal Area	% of respondents in agreement	# of partners addressing these priorities	% of those addressing priorities who would like to collaborate with MG on these goals
Access to Care	95.2%	14	92.3%
Tobacco	100%	11	75%
Chronic Disease	89.5%	13	88.9%
Substance Misuse	84.2%	10	85.7%
Infectious Disease	89.5%	11	85.7%

- 4) Review and approval of the feedback results of the community opinion survey by the Community Health Improvement Committee of the Board of Directors regarding community health priorities and goals for MaineGeneral Medical Center. After this process a list of Community Health Priorities, Goals and Metrics were identified and approved by the Community Health Improvement Board Committee, and the Implementation Plan was developed.

3. Community Health Priorities for 2013-15

The chart below lists each of the selected priorities identified via the assessment process, reviewed by the Community Health Improvement Committee, and recommended for approval at its meeting on May 20, 2013. One or more measurable goals are listed for each priority. A list of one or more activities with targets proposed to help achieve the goals has also been developed.

Priority Area	Goals/Indicators:
Tobacco	Goals/Indicators: Reduce Adult Smoking Rate by 10 % from 20% to 18% .
Chronic Disease Prevention and Management	Goals/Indicators: <ol style="list-style-type: none"> 1) Reduce number of people who are overweight/ obese by 3% from 65% of the population to 63% . 2) Increase number of adults reporting 150 minutes + of exercise/ week . 3) Decrease adults reporting sedentary lifestyle by 9% from 21% to 19%. 4) Increase % and # of patients with comprehensive Diabetes Care A1c Screening 1X/yr. 5) Improve Diabetes Control measured by A1C >9 and <7. 6) Increase % and # of patients with comprehensive Diabetes & Heart Stroke LDL < 100 and LDL>130. 7) Increase % and # of patients with comprehensive Diabetes Care BP NCQA < 130/80. 8) Increase monitoring of BMI in all adult patients. % adults with BMI recorded in EMR. 9) Increase % and # of patients Adults 50—75 with colonoscopy screening in last 10 yrs. 10) Increase % of Females 50—69 having Screening Mammogram every 2 yrs. 11) Increase % of children with BMI % recorded. 12) % of children Age 2-19 with asthma with “Action Plan” in place. 13) # Tobacco users screened who are offered counseling. 14) # Tobacco users using Maine Tobacco Helpline and MG smoking cessation counseling. 15) Increase the # patients screened annually or specific triggers for depression using PHQ2 or PHQ9 16)% of Adult patients with CVD with BP <140/90.
Primary Secondary & Tertiary	Goals/Indicators: <ol style="list-style-type: none"> 1) 90% of Kennebec County medical providers are registered users of PMP. 2) 50% of MGMC primary care practices adopt CLIPP guidelines. 3) Reduce # of overdose deaths over previous 3-year average. 4) # of Counselor FTEs providing integrated care in primary care settings.

Priority Area	Goals/Indicators:
Prevention of Substance Misuse morbidity & mortality	5) # of primary care practices with integrated behavioral health care (4 is 2013 baseline).
Infectious Disease	Goals/Indicators: 1) % Pediatric patients (19 to 36 months) with up to date immunizations (CASA). 2) # of Flu Shots provided to 50+ patients and children 6 months – 18 years. 3) % of enrolled students immunized in SLVC clinics and MGMC primary care. 4) % of the adult population reporting influenza vaccination.
Access to Care	Goals/Indicators: 1) Decrease 3% E and M level 2 and 3 patients' use of the Emergency Department annually. 2) Increase by 5% the percentage of population reporting a usual primary care provider.
Data and Indicators	Goals/Indicators: 1) Evaluation of Maine Community Health Needs Assessment Completed 2016. 2) MGMC CHNA Implementation Plan Approved by MGH Board by June 30, 2016.

Data Sources for the above identified metrics are:

PCMH Pilot Report, MGMC EEHR, NCQA Heart/ Stroke Report, Asthma Quality Report, Maine PMP Report, Maine Medical Examiner Unattended Mortality Report, IMMFACTII, Prevention Center Data Report, BRFSS = Behavioral Risk Factor Surveillance System

4. Community Health Improvement Implementation Plan

Tobacco Use Prevention/ Cessation Implementation Plan

The one primary goal of this implementation plan is:

- 1) Reduce Adult Smoking Rate 10% from the current level of 20% to 18%.

Strategies:

Increase by 20% the number of MGMC inpatients and families provided cessation support follow-up and outpatient support services.
Increase promotion of free cessation services via targeted outreach to community settings to the behavioral health populations via (warming shelters, soup kitchens etc.).
Establish new system to promote the use of “tobacco use cessation technology, such as phone aps / online cessation” to all young adults smokers. (Age 18-40) by Dec 30, 2013.

Implementation Overview:

The goal of decreasing smoking behavior in all age group involves supporting environmental strategies, community and worksite policies, screening for tobacco use in health care settings, creating easy access to cessation support via the practices, hospital community settings, via the telephone or the use of effective cessation phone applications. MaineGeneral will integrate free tobacco cessation services in all of its clinical and community settings, directing all smokers identified to the Prevention Center hub for smoking cessation navigation assistance. MGMC intends to maintain its Gold Star hospital rating as a smoke free campus supporting employees, patients and visitors via a variety of policies and strategies. MGMC also will serve as fiscal agent to the local Healthy Maine Partnership, which works on smoke free environment policy strategies in community settings.

Chronic Disease Prevention and Control Implementation Plan

The goals addressed in this implementation plan address the following chronic diseases:

- Obesity
- Diabetes
- Colon Cancer and Breast Cancer

- Childhood Asthma
- Depression
- Cardiovascular Disease

Strategies:

Implement accountable care strategies throughout primary care practices to prevent disease and reduce cost.
Expand use of pre diabetes and diabetes screening algorithm in 6 MGMC owned primary care settings.
Develop routine referral systems to NDPP, Move More and self-management skill development programs.
Increase evidence based program enrollment and completion of by 50% from previous FY.
Develop peer navigator program and train a minimum of 12 navigators to support patients with chronic conditions in FY 2013-14.
Establish 5 new evidence based disease self-management program sites in existing primary care practices.
Secure \$200,000 in grant funding to enhance financial support the above CD activities.
Achieve 100% of primary care practices routine use of MEDSmart, medication safety tools.

Implementation Overview:

The goals focus on reducing the burden of chronic disease by providing primary, secondary, and tertiary prevention services in all of MaineGeneral Health's clinical care settings and in partnerships with community partners. MaineGeneral's primary care practices with the support of Care Partners, the Community Care Team and the Prevention Center are working together implementing many evidence-based strategies and programs to achieve these goals. Changes in workflow in an accountable care environment, use of EHR tools, expansion of screening guidelines, medication safety strategies including patient and family targeted MEDSmart messaging and algorithms to screen for and prevent disease and provide early intervention are just a few examples. We are expanding evidence based self-management programs such as the National Diabetes Prevention Programs (NDPP), Chronic Disease Self-Management and Chronic Pain Programs in clinical and community settings. Detailed logic models, work plans and strategy descriptions exist for each of the goals.

Primary, Secondary, and Tertiary Prevention of Substance Misuse Implementation Plan

The 5 goals addressed in this implementation plan are:

- 1) 90% of Kennebec County medical providers are registered users of Prescription Monitoring Program (PMP).

- 2) 50% of MGMC primary care practices adopt Compassionate Limits Prescription Plan (CLIPP) guidelines.
- 3) Reduce # of overdose deaths over previous 3-year average.
- 4) # of Counselor FTEs providing integrated care in primary care settings.
- 5) # of primary care practices with integrated behavioral health care (4 is 2013 baseline).

Strategies:

Integrated care utilizing BH services in 100% of MG owned Primary Care settings.
Outreach to 100% of new PCPs employed by MG to provide PMP technical assistance and training.
Develop by January 1, 2014 integrated harm reduction program that integrates overdose prevention, HIV/Hep C prevention , needle exchange counseling and screening services, naloxone use education to high risk adults.
Offer 6 MEDSmart Medical Education Series re CLIPP, SBIRT , chronic pain etc.

Implementation Overview:

The five goals focus on two major issues in our region. The first, prescription drug addiction, is an epidemic in our region, and MaineGeneral has selected several goals and strategies it is best positioned to address. These strategies will decrease access to prescription drugs that might be diverted and misused resulting in addiction and opiate overdose incidence and mortality. Health care providers at MGMC are implementing a set of guidelines known as CLIPP (Compassionate Limits Prescription Programs) which includes getting all medication prescribers to register for the Prescription Drug Monitoring Program (PMP). The PMP allows providers to see what prescriptions have been filled for patients, and allows them to address possible medication errors, misuse, and drug seeking behaviors seen in patients with a substance use disorder or those involved selling prescriptions. The second focus is on increasing access to behavioral health services in primary care to provide both mental health and substance abuse treatment. Increasing access to these services by co-locating providers is one additional strategy mentioned in the access to care section of this implementation plan. These goals are access goals as well as goals related to substance misuse.

Infectious Disease Implementation Plan

The four goals addressed in this implementation plan are:

- 1) % Pediatric patients (19 to 36 months) with up to date immunizations (CASA).
- 2) # of Flu Shots provided to adults over 50 to children 6 months-18years.
- 3) % of enrolled students immunized in school-based clinics and MGMC primary care settings
- 4) % of the adult population reporting influenza vaccination.

Strategies:

Implement community wide influenza vaccination campaign utilizing medical center employees and school contacts.
Promote Childhood vaccination in primary care settings and via community outreach events.
Implement School Vaccination Poster Campaign in 2013 and 2014.
Influenza vaccination promotion to all age groups via primary care and MGMC.

Implementation Overview

The four goals for infectious disease target increasing vaccination rates in all age groups. Childhood immunization is a primary focus of MGMC primary care practices which have selected strategies to educate parents about the need for vaccination and developing systems to assure children receive all recommended vaccinations by age 3. Increasing access to influenza vaccination for all age groups is a second major priority. MaineGeneral's emergency room use has been high when influenza vaccination rates are low in the community. A primary target group is preschool and school age children, reached via the Prevention's Center School Located Vaccination Clinics. This service provides vaccination to children who are unable to get to their primary care provider in the Fall at the beginning of the flu season. This service is provided free of charge to the schools and families.

Access to Care Implementation Plan

Two Primary goals to be addressed in this implementation plan are:

- 1) Decrease by 3% patients' use of the Emergency Department for the most minor accidents and illnesses.
- 2) Increase by 5 % the percentage of population reporting a usual primary care provider.

Strategies:

Health Education outreach to uninsured and underinsured and referred/ enrolled in available health care coverage and services.
100% of practices and Prevention Center navigation staff promote use of medical home and express care use in MG service area.
Patient navigation services provided by Prevention Center to 100% of ED patients without PCP and patients with access barriers.
Expand use by 25% of the colorectal cancer screening and free mammogram screening services for uninsured and underinsured within the MGMC service area.
Expand From the First Tooth Project to 10 additional primary care practices serving children age 0-4 in the MGMC service area.

Implementation Overview:

These goals of improving access to appropriate preventive care involve creating open access to primary care to all patients regardless of their insurance status in the MaineGeneral service area. Decreasing costly non-urgent, preventable emergency room use can only be accomplished by assuring everyone in the community has access to primary care.

This will be accomplished by transformation of primary care practices in the region, a centralized system for ongoing monitoring and reporting of open practices, and patient access via Care Partners, the community care team, the Prevention Center's navigation services, and the new MGMC 24/7 information line.

Data and Indicator Implementation Plan

The two goals addressed in this implementation plan are:

- 1) Evaluation of Maine Community Health Needs Assessment Plan Completed 2016.
- 2) MGMC CHNA Implementation Plan Approved by MGH Board by June 30, 2016

Strategies:

Finalize plans, selection for core and extended health status indicators for the Maine Community Health Assessment.

Finalize Agreement /MOU with all partners and secure funding for MCHNA and Hire Vendor to complete
Hold Community Forums to identify priorities for the Central Public Health District
Write Implementation plan and obtain MGH CHIC guidance for Board Approval.

Implementation Overview:

These goals focus on MaineGeneral's involvement in establishing infrastructure and agreements for ongoing statewide community health needs assessments that will inform priorities for community health, health care and public health planning. In addition these goals will provide use with data/metrics for ongoing monitoring of the impact of our community health improvement efforts. Dedicating staff time of the planning department, the Prevention Center and MaineGeneral leadership, Board Members and Medical staff to direct the identification of data and indicators, a community engagement process, and the development of a community health implementation plan every three years will allow MaineGeneral Medical Center to improve the health of the communities it serves.

5. Resource Commitment

The MaineGeneral budgeting process for community health improvement implementation occurs each fiscal year across the organization. Funding for the many goals and strategies outlined in this implementation plan includes dollars from MGMC's operational budget, including charity care; funding from the MaineGeneral Community Health Fund (an endowment); and grants and contracts MGMC actively seeks and secures to address the identified community health priorities.

6. Health Needs Identified Not Being Addressed by MGMC

Two other priorities were identified by the assessment process that the stakeholders felt should be addressed. These are teen pregnancy and oral health. MaineGeneral, due to its other priorities for resources, will not be establishing goals, strategies and metrics for the problems of teen pregnancy, oral health care screening for children 4 to 17, and urgent oral health care and preventive care for adults who have no dental insurance.

MaineGeneral does not have the financial or staff resources and expertise by itself to address these issues; however, MaineGeneral will participate with its community partners, such as the Sadie and Harry Davis Foundation, MaineHealth, and The Community

Dental Centers in Waterville and Augusta to address the oral health access priorities identified. The Family Planning Association of Maine and several community coalitions are examining the teen pregnancy issues. MaineGeneral will explore how it can support these efforts, but will not be committing resources to these priorities.

7. Proposed Future Maine Universal Community Health Needs Assessment (MUCHNA)

In 2012, Maine CDC, USM Muskie, UNE and the OneMaine Health Collaborative (MaineGeneral, Eastern Maine Health, and MaineHealth) began work to integrate existing data collection, assessment and community engagement/dissemination processes to achieve efficiencies and broader use of resulting products. Broader use can be described as the return on investment - the more entities that can be integrated into a common, universal process to meet various regulatory, health planning and fund raising goals, the greater the ROI. The selection of community health indicators and metric selection is now underway by a MUCHNA subgroup comprised of key stakeholders from Maine CDC, health systems, and public health departments, Maine Primary Care, University of New England and University of Southern Maine Muskie School for Public Health.

The Vision for the potential participants and their respective roles follows.

- Maine CDC will use the MUCHNA to fulfill the public health accreditation requirements and to inform its State Health Improvement Plan.
- Maine CDC will support the SCC, DCCs and HMPs in the use of the MUCHNA for their local/regional health planning obligations.
- Bangor and Portland Public Health Departments will use MUCHNA for accreditation and planning purposes.
- OneMaine will collaborate with MHA, assuring all the state's hospitals can utilize the MUCHNA to develop local community needs implementation plans as required by federal law within their IRS 990 documents.
- All health providers/systems engaged in health reform and accountable care will use the MUCHNA for population health planning and goal setting strategies.
- Maine Primary Care Association will use the MUCHNA for their federal planning and reporting requirements.
- The University of New England and the University of Southern Maine Muskie School for Public Health will support the development, refinement and dissemination of the MUCHNA as a core purpose of their shared Public Health Institute.

- MeHAF will promote the MUCHNA to all grant makers so applicants will be able to access the MUCHNA data for their proposals with targeted outcomes based on the data.
- United Way of Maine will be able to access the MUCHNA data when their missions are related to health service access and health status.
- Community health coalition and social service organizations may use MUCHNA to support their local planning and grant writing initiatives.
- A standardized “community engagement” strategy (see attached) will be included alongside the MUCHNA to better engage and inform stakeholders in the use of data for planning, implementing and evaluation of initiatives .

By 2016, the MUCHNA will be widely recognized as a critical tool for health planning.

Community engagement in the use of MUCHNA for local and regional planning purposes is a critical part of the needs assessment process. The following phases for community engagement will guide the community forum activities as recommended by the community engagement committee of OMH.

Preparation Phase

An advisory committee of all partners listed below will comprise the advisory committee

- Public health
- Community health coalitions
- Healthcare providers
- Minority populations
- Business or civic leadership
- Funding agencies
- Local and state government
- Academia

The advisory committee will inform research and survey development that build on the MUCHNA to refine key questions and/or to be more granular in its broad findings. The committee can also help promote community forums or the use of the planning data resulting from the process.

Identification of Priorities and Dissemination of Data Phase 1

The health care system and hospital, or public health entity sponsoring the health planning process should host a community forum. The objectives of the forum should be to:

- Provide stakeholder awareness of the data/results from the MUCHNA or subsequent research built on that resource;
- Invite local stakeholder input on what the data means to each local community/region;
- Solicit local stakeholder input on what issues should be prioritized locally;
- Solicit local stakeholder ideas on existing resources or new initiatives that should be aligned/developed to address the prioritized issues.

Stakeholders to be included should be:

- Public health representatives
- Community health coalitions
- Business and civic leaders
- Legislators, or other governmental leaders
- Minority populations
- Academia
- Social service agencies (including United Way)
- Local news media
- Health Centers
- Local Medical Staff Leaders

Recommended activities for the Forums include data presentation and discussion followed by breakout sessions for stakeholders. The breakout sessions are to solicit feedback on priority issues, existing resources to be engaged in the issue, and ideas on the types of initiatives that might be successful in favorably influencing the issue. Breakout topics will be chosen from major themes that have emerged from the MUCHNA or subsequent research/surveys, especially those that resonate with local concerns. Facilitators for each breakout should be selected and oriented in advance to assure neutrality in collecting unbiased

feedback from participants, knowledge of the subject matter and detailed knowledge of the MUCHNA methodology and findings.

Draft Standard questions developed by the Community Engagement Committee are:

- What issues in the data should be prioritized for follow up action?
- What additional questions do we have about the data, and how can we get these questions answered?
- What opportunities exist for collaboration to address each priority health issue?
- What are some action steps that we can take now to address this issue in a collaborative way?
- Are there specific issues for disparate populations that will need to be addressed?
- Who else needs to be brought into the conversation?
- What is the next action step?
- What agencies or organizations can provide leadership to assure the next steps are taken?

Community Health Improvement Implementation Plan Development

The outcome of phase 1 will be selected priorities and the creation of work groups with lead organizations developing implementation plans and securing funds to address the identified priorities. Hospitals will develop a written implementation plan outlining the priorities it intends to address, both independently and collaboratively with community partners. This plan will also describe the reasons it is not addressing other priorities identified by the assessment including those that other organizations are assuming responsibility for. The Community Health Improvement Board Committee is responsible oversight of the development of it MaineGeneral Medical Center Implementation Plan, which must be approved and adopted by the Board of Directors prior to June 30 of the fiscal year the assessment is conducted.

Assessment and Implementation Plan Dissemination

A central website will be established to provide easy access to the MUCHNA and local research/surveys correlated to it. Feedback collected from forum breakout sessions will be posted there as well. MGMC will also make copies of the MUCHNA report and implementation plan available to anyone, as well as provide a link to access it on its website. The availability of the data and website will be broadly promoted. Local media coverage subsequent to the community forum is very helpful. A phone number will be publicized for people needing to ask questions about the data, or requesting printed information.

8. Implementation Plan Information

Additional detailed information on this community health needs assessment implementation plan can be obtained by contacting Public@MaineGeneral.org.

Appendix A

Appendix B

Appendix C