

Health care sustainability utilizing the SIRAPP program

Review of literature on the subject of sustainability in health care revealed two primary models. The first, proposed by the Conference Board of Canada, comprised of six pillars on four foundation levels as shown in Figure -1. Lapelle *et al.* (2006) contends that sustainability also requires an improvement loop which supports and measures innovation in aligning services with organizational goals.

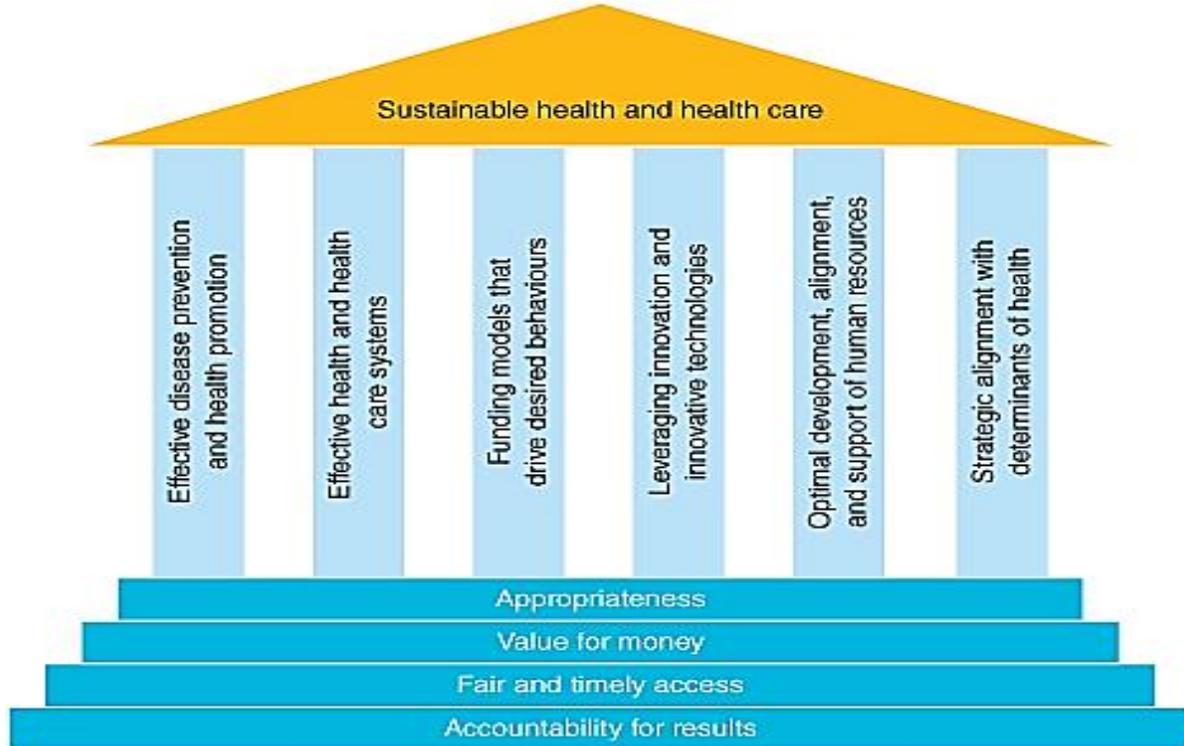


Figure -1 Pillars of Sustainability

*Conference Board 2012

Together, this suggests that a sustainable health care program requires:

- 1) Optimal health outcomes such as effective disease prevention and health promotion;
- 2) Meeting the health care needs of individuals;

- 3) Effective health care systems that can measure outcomes and efficiently deliver health care;
- 4) An effective funding model that supports and sustains effective health care systems;
- 5) Driving desired behaviours to facilitate change in how health care is done and better health is accomplished;
- 6) Innovative thinking and technologies that support change in how health care systems are run and measured;
- 7) Supporting adaptive organizational alignment that is flexible to patient needs and demands on the health care system;
- 8) Flexibility to adapt to cultural, social and economic conditions that are part of the day to day nuance of human interaction;
- 9) Delivery without compromising the outcomes and ability of future generations; and,
- 10) A sustainability loop that addresses shortcoming, failures, and builds on prior successes.

Given these 10 elements, the following expected outcomes were developed to integrate health care sustainability into a prevention program.

- a) A health recovery focus that delivers greater than 50% measurable health recovery/ reversal in candidates;
- b) A sustainable prevention PSHC program using a systems implementation approach with an open learning component;
- c) A funding model that returns and measures financial benefits to the PHCS after cost recovery;
- d) no program subsidy requirements;

- e) Indoor environments that remain free of consequential molds and dampness;
- f) An onus on the patient to maintain and monitor their indoor environment;
- g) Ongoing monitoring and adaptive management for innovation; and,
- h) The development of methodologies that transcend this program and support new prevention programs.

Sustainability is both a financial-based goal and an organizational-based goal. In whole, these outcomes would be intended to be achieved through a sustainability model.

5.5 Health care prevention program and implementation strategy

5.5.1 Program overview

It is proposed that a sustainable mold and dampness prevention program could enhance the existing methods undertaken by the PHCS to reduce asthma risk levels and increase the functional life of an environmentally affected asthma patient. The sustainability principles and assumption behind this program are based on:

- 1) The PHCS continuing to move towards more proactive, prevention-based medical solutions;
- 2) Proactive, prevention-focused decision-making based on risk assessment benefit costing;
- 3) Measured reduction in reactive treatment-focused decision-making over the longer term;
- 4) Prevention strategies and sustainability are cornerstone requirements of a successful prevention program;
- 5) Program success depends entirely on people; and,
- 6) The primary motivating factor for program sustainability, beyond altruism, is economic benefit.

It is proposed that the “Sustainable IAQ Residential Asthma Prevention Program” (SIRAPP) be administered by and through the Ministry of Health. There are other administrative manager options, such as through private insurance, or a for-profit health care manager; however, the PHCS is arguably a good choice, for the following reasons:

- 1) The proposed SIRAPP may provide the PHCS with significant economic benefits (reallocation opportunities) in short order;
- 2) The SIRAPP is designed to integrate with the necessary administrative oversight and infrastructure of the PHCS already in place for the most part;
- 3) SIRAPP would bolster of the image of the PHCS as a health leader; and,
- 4) If not delivered within the PHCS, some of that infrastructure would likely have to be shifted to a provincial or private body or created to administer the SIRAPP, which might produce significant angst among relocated unionized employees and additional unneeded infrastructure costs.

For these reasons, it is proposed that the SIRAPP be administered through the PHCS. One-time start-up funding for SIRAPP implementation has been assumed through the Ministry of Health with operations funding from internal cost reallocation such that no external funding would be required beyond start-up with start-up costs recovered within one year of implementation. It is suggested that the specific details of SIRAPP implementation would be determined by regional health authorities and individual hospitals, based on policies and procedures set by the Ministry of Health. Ongoing monitoring of SIRAPP costs and benefits through patient recovery and their associated reduced PHCS use would be tracked and analysed. Historic pre-SIRAPP patterns of hospitalization would be used as a baseline for economic benefit determinations, based on individual patient assessment.

Policy support for the SIRAPP already exists via the BC disease prevention and health promotion policy pillar, and the PHCS would leverage the HEALTH² tool as a health care innovation technology; however, the SIRAPP funding model is the key to its sustainability. With few examples of net positive funding models existing for the SIRAPP to follow in BC, the program details will require further research and policy analysis to refine, including a possible pilot program. A prevention program in BC that was reviewed is the BC Ministry of Health fall-prevention program called “Falls and Related Injuries in Residential Care: A Framework & Toolkit for Prevention” (MoH 2014). The program was initiated after medical practitioners and researchers confirmed that seniors’ injuries due to falls were over-represented, and found science-based prevention measures to reduce fall risk. Available on-line web-based sources outline the problem, impacts, outcomes, goals, and strategies to accomplish the goals. Information was lacking on program funding strategies. The ICBC road improvement model previously discussed is also an excellent reference in program development.

The proposed SIRAPP program would identify patient candidates, verify that their asthma condition and home environment falls within program applicability, remediate the problem source, and monitor patient health and PHCS utilization. From initial discussions with medical practitioners, it appears that SIRAPP could be carried out within existing staff complements and coordination capacities; however, some reallocation would likely occur, for example, of personnel who treated high-use patients in the ED and hospital wards, to other PHCS priority areas.

Subsequent to a home environmental audit, remediation and repair, the home would be maintained by the patient to prescribed SIRAPP healthy-home criteria. Partnering with the patient is a consideration via social contract, as a way of moving forward to preclude personal

privacy concerns and obtain legitimate buy in. Under social contract, the patient would maintain their health, home health, and hygiene levels and self-report on-line or through already existing channels, thus allowing for feedback and educational input from SIRAPP staff, including addressing any hazard potential promptly as part of normal residential maintenance. As such, ongoing costs for maintenance of home healthiness have not been proposed in SIRAPP budgets, although funding for building environment inspections and site follow-ups may become appropriate.

The benefits of reduced PHCS utilization by the patient would be measured and resources reallocated to other PHCS areas as the SIRAPP program reduces ED and hospital bed demand, with reduction measured and validated on an ongoing basis. Lack of demand reduction would require prompt attention. Post-remediation PHCS patient use would be compared to their historical records. The PHCS expected direct benefits would include: reduced reactive medical provision; reduced health care costs; and more sustainable, proactive medical services (Prevention Institute 2014).

To define SIRAPP success, specific program objectives are recommended. These objectives are a minimum based on research and results in chapter four, and would be refined after the initial pilot project and/or the first year of SIRAPP operation, as follows:

- 1) Full payback of SIRAPP start-up costs within one fiscal year;
- 2) Benefit to cost ratio of $\gg 1$ (2:1 per ICBC);
- 3) Overall positive NPV per identified high-use asthmatic patient; and,
- 4) Initial program subscription rates (and remediated homes) increase by a specified percentage per year, based on reported SIRAPP capture success to date.

5.5.2 Implementation Strategy to Shift to an Outreach Prevention Program

Long-term SIRAPP success will depend on ongoing cycles of identification, remediation, monitoring, evaluation, and refinement. The process would shift healthcare workload from reactive, ED-centric measures to proactive, outreach, patient home-centric measures. The reallocation of savings could be directed into an extension of the prevention program, outreach, using the following measures of effectiveness measured continuously: 1) decrease in the number of ED and doctor visits, and severity of cases; 2) decrease in the costs of associated emergency care; and, 3) decrease in patient-doctor contact hours.

The proposed sustainable IAQ residential asthma prevention program (SIRAPP) would use a systematic approach undertaken by the PHCS, the Ministry of Health, and /or the Health Regions in accordance with generally accepted ED medical process such as defined in EDACP (March 2013) *Medical Guidance Document and terminology* and Vancouver Coastal Health Emergency Department protocol initiative acute asthma management toolkit *Probable diagnosis of asthma – moderate to severe uncontrolled scope* (VHPHC March 2006). These are accepted medical protocols and procedures for the emergency room asthma care pathway in British Columbia.

A proposed process flow chart is provided in Figure 5.2. The chart indicates how the patient would transition from the traditional ED process to the SIRAPP program. The SIRAPP process flow chart outlines the suggested steps to be taken in the emergency department (ED) beyond the traditional ED process flow. Should a candidate be considered from the healthcare field, such as their physician's office, the modified approach is noted in the process steps.

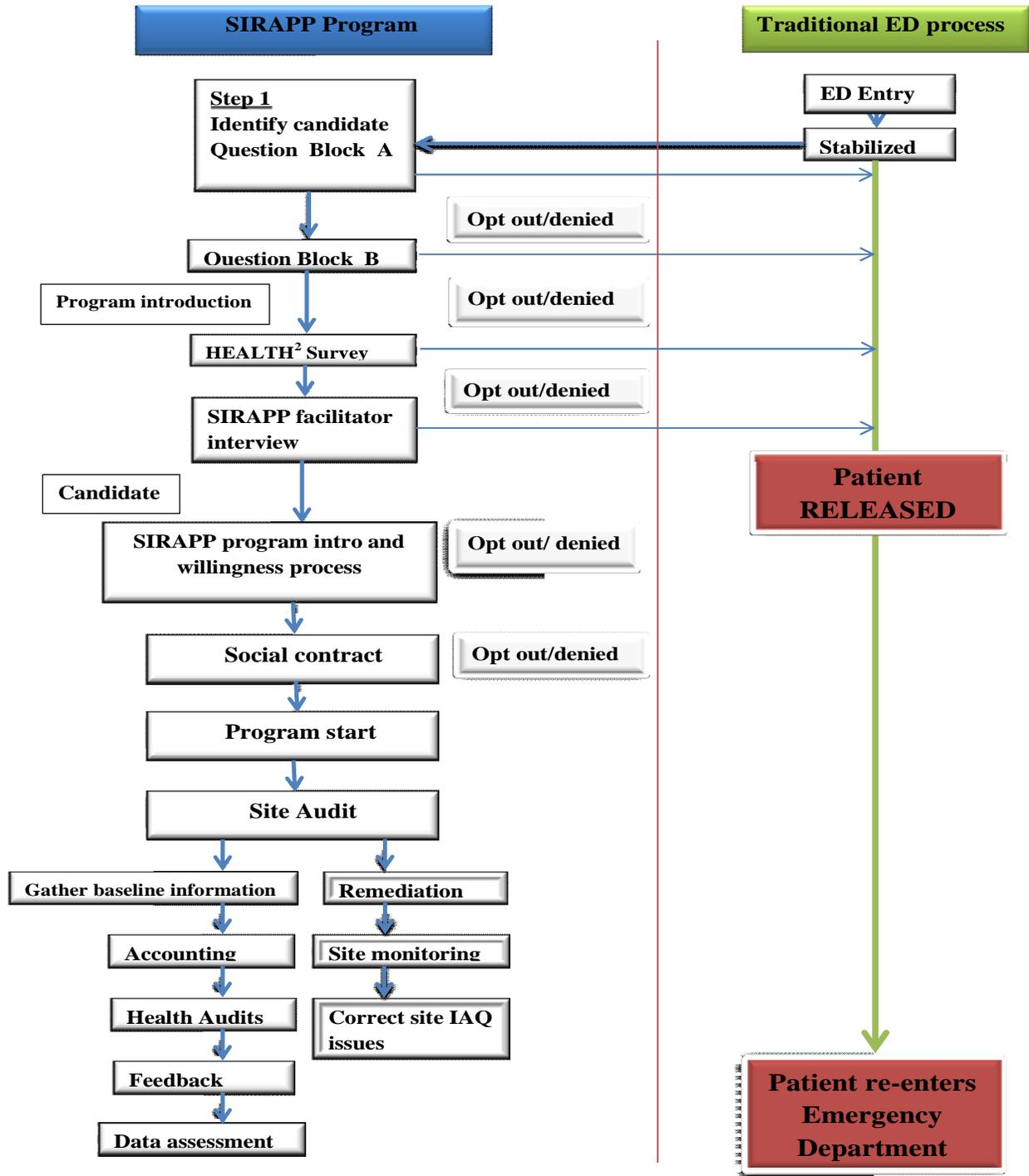


Figure -2 SIRAPP Flow chart

* see Table 5-4 for description of question blocks A & B.

Program development and the SIRAPP process flow chart shown in Figure 5-2 includes the following possible components and steps:

1. Identify possible candidate. The acceptable candidate will have moderate to severe uncontrolled asthma confirmed by a medical practitioner that may be environmentally induced (other exacerbation triggers ruled out). The candidate is considered for the program in the ED or physician office by referral from healthcare professionals to the SIRAPP representative. The move forward criteria is based on two sets of question blocks noted in Figure 5-2 that would eliminate other triggers or conditions and give the staff a methodology to confirm or deny an environmental trigger condition. Question block A is a health check for applicability. If the criterion is met, then the health care worker will undertake question block B, environmental site questions. Refer to Table 5-4 for details of the question blocks.

Table -1 Question blocks A and B

Question Block A

- History of respiratory issues
- Significant function reduction
- Numerous debilitating attacks
- Health history

Question Block B

- Issues specific to patient's residence
 - Previous home history
 - Residing > 3 mos.
 - Okay away from home
 - General Environment Question
-

Step one is designed to screen all patients and identify candidates with the highest likelihood of being indoor environment mold and dampness affected and to minimize the impact on the traditional ED process. At step one acceptance, after the patient has been stabilized and is medical professional approved to do so, they are introduced to a SIRAPP

facilitator at step 2 of the process. The role of the SIRAPP facilitator is summarized in Table 5-5 after the process step summary.

2. Program introduction. Upon determination by a medical professional that the patient met candidate health criteria, pertinent information about their home environment would be gathered from the candidate in person at the ED, by phone or mailed-in survey, and inputted in the HEALTH² tool. The potential candidate is introduced to the program benefits and process, including patient responsibilities under the SIRAPP (sustainable IAQ residential asthma prevention program). Upon initial acceptance, the stabilized patient will be helped with completing the HEALTH² occupant survey to ensure accurate results. If the house health score is 32 or higher (concerning), the patient will be then interviewed by a SIRAPP facilitator to verify the information provided and to further evaluate the occupant's health condition and the residence state.
3. Candidacy: With steps one and two complete, the patient becomes a candidate for the program and is introduced to the program and their willingness to participate is gauged. If amenable, the candidate is introduced to the social contract for acceptance. Otherwise, opted out of the program. After the social contract is signed the process becomes formal and the SIRAPP investigator begins the program start.
4. Social contract. A social contract will be necessary to protect the rights of the individual and time and fiscal commitment of the PHCS. The contract will define the parameters of the program, roles and responsibilities of the health region and patient, allow access to the home, and provide for ongoing and future research. When the social contract is signed the candidate is indicating willingness and engagement with the program.

5. Program Start. Administrative staff will present the necessary forms and ensure their accurate completion. Refer to Table 5-5 for the summary of SIRAPP facilitator's roles and responsibilities. The following will then occur:
 1. The candidate is registered with the program and given a management toolkit. The tool kit will include the necessary forms the Client and the program manager are required to complete at onset through the duration of the program. These can include medical records, medical tasks, physician orders, incidence reports, and feedback forms.
 2. The SIRAPP facilitator in concert with the physician of record will develop the program timeline and set the date for site audit and remediation program.
 3. The home is physically remediated and the candidate is educated on the process and their responsibilities after the site audit is completed. The candidate's medical history will be important. The starting phase of the program would benefit from a candidate with a long detailed applicable medical history of high medical system usage to best expose and highlight the benefits of the program.
6. Site audit. A formal audit of the home environment for dampness and mold is conducted and matched to the HEALTH² occupancy survey. The exclusively visual site assessment will be conducted by a SIRAPP pre-approved IAQ professional and a report will be written using the HEALTH² tool to validate the candidate's indoor environment. The home healthiness index (HHI) and resident health score (RHS) are then compared to the candidate survey and the hospital emergency department (ED) or asthma care centre assessment. The (HHI) output value from the HEALTH² tool would be compared to the RHS to determine a match between occupant health issues and home environment. An

HHI score of 32 or higher with an environmentally sensitive high-use asthmatic resident, for example, would constitute a fit with the program. If the results correlate to a medically diagnosed mold and dampness environmental trigger and significant health effect, then proceed to step 7 - remediation. If the site audit or assessment process fails at any point along the way, the candidate will be informed and opted out of the program.

7. Remediation. Upon approval of the home for environmental remediation, a professional remediation firm is chosen from a SIRAPP list of pre-approved contractors. The work will be overseen by applied microbial remediation technicians (AMRT) or equivalent, certified to remediate damp and moldy indoor environments to IICRC 500/520; CCA 82 (2004); and/or New York Dept. of Health “Guidelines on Assessment and Remediation of Fungi in Indoor Environments”. Final assessment of a health safe environment will be conducted by a third party environmental professional (professional Engineer or Industrial Hygienist with demonstrable expertise) visually and by limited air and bulk sampling as required.
8. Baseline: Gathering health data and monitoring. A medical team approach will be applied to gather and manage the health data of the candidate and measure their progress and document the cycles of health care interaction going forward. The resulting data will be integrated with accounting records to identify hospital utilization variations for the purpose of measuring financial impact.
9. Medical system indenture. In concert with baseline data gathering, the approval process will include formal medical acknowledgement and verification from the traditional ED process for asthmatics that the health effects are environmental induced (as opposed to other triggers, such as, genetics, gender, age, ETS, etc.).

10. Validation. Ongoing data gathering on the candidate's health and PHCS utilization will be compiled. Verified benefits and resource savings will be drawn from the health care budget for use to either expand SIRAPP and the acquisition of more candidates, or allow the Ministry to reallocate resources.

Table -2 SIRAPP Facilitator Roles and responsibilities

- HEALTH² Survey score >32 required
 - Stage 2 interview
 - Program introduction
 - Confirms willingness to participate
 - Parental/guardian consent
 - Social contract
 - Parental/guardian consent
 - Coordinates site audit w/ Qualified professional
 - Initiates file, initial data entry
 - Manages file
 - Direct contact w/ accounting/ health care staff/ doctor
 - Oversees site/ health audits
 - Home repairs
 - Patient compliance
-

Program insertion through the PHCS is considered at the ED or otherwise through the physician's office. Within the ED, several points of insertion have been considered, from the admitting nurse, to the emergency health care provider or physician in charge to identify the potential candidate. More practically, other possible insertion points would include: 1) pre-ED through pre-screening of administrative data, or reaching out to the higher probability demographics such as aboriginals and low income families; 2) nurse practitioner through home care or asthma care outreach and education programs; and 3), through private corporation internal health care programs. For the PHCS option, significant assessment and discussion is required to ascertain the best model due to overcrowding and high stress levels already in place. Another consideration for further assessment is outsourcing the SIRAPP as a specialist support

program that is referred to by family physicians and hospitalists as asthma care is generally conducted. Irrespective, the patient must remain in the care of their physician.

5.5.3 Program next steps

1. Feedback: the patient, candidate, physician, IAQ specialist and contractor feedback process will come into play to check the system accuracy, timeliness, and flow. Errors will be corrected.
2. Program expansion: a successful asthma prevention program would expand to 1) consider the moderate to mild uncontrolled environmental mold and dampness affected asthmatics; and 2) address those affected by other potentially reversible environmentally induced respiratory diseases as long as the program goals and criteria are met. It is expected that the level of productivity gain and cost benefit will drop as the most severe cases are addressed. By expanding the program to a broader outreach, by anticipating the laws of efficiency, and developing higher cost effectiveness in the systems as those systems used to facilitate the program become familiar, it is possible that the program can function with a lower level unit benefit.

The timeline to progress through the various steps and stages of the program will be dependent on the patient, availability of candidate slots, and degree of rigor of the process. It is left to the PHCS administrators, based on their expertise with other program monitoring, to determine the level of rigor required to verify the facts that validate success of the sustainable IAQ residential asthma prevention program (SIRAPP). Preparation for the introduction of the SIRAPP initiative would include training ED staff as well as general practitioners to identify candidates through a medical decision tree protocol adapted from emergency department asthma

care pathway or ED protocol for environmentally affected acute asthma patients will be produced prior to implementation of the program.

To validate the patient's home residence as the probable cause of asthma exacerbation, the HEALTH² home survey would be conducted in the ED or physician's office from a web access portal. The program survey would be introduced to the potential candidate by trained health care staff with web-accessible tablets. Introductory information provides the outline for data gathering after the welcome page, as shown in Figure -3 below. A detailed template layout is provided in appendix G.

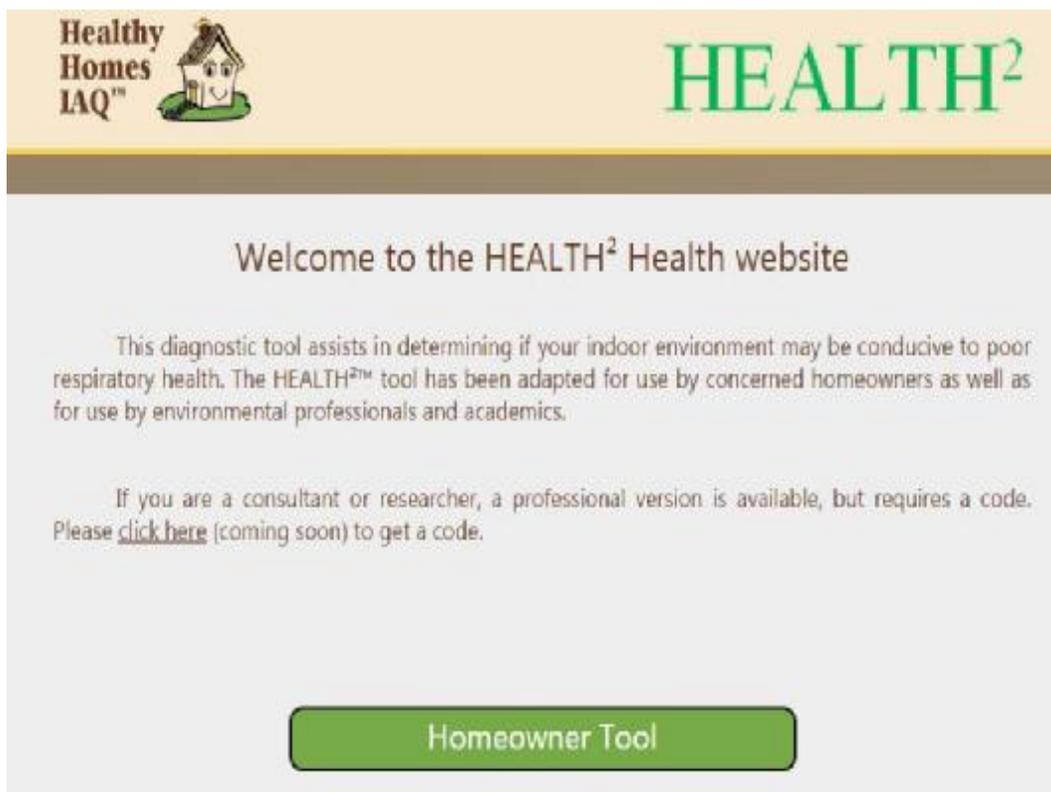


Figure -3 HEALTH² Software interface

The candidate would be guided through the survey step by step by the SIRAPP facilitator to answer the survey questionnaire and be prompted to provide additional input as required. The first step, outlined in Figure -4, is to provide general information about the patient's home

residence. This helps the SIRAPP facilitator at a later stage to determine the level of health and environment connection.

Healthy Homes IAQ™  **HEALTH²**

House Type

Check all that apply to your house

Windows:

- Single pane windows
- Double pane windows

Crawlspace:

- No Crawlspace
- Crawlspace has a dirt floor or is uninsulated
- Crawlspace has plastic or concrete surfaces

Wall Construction:

- 2x4 wall construction
- 2x6 wall construction

Insulation:

- Less than 6" insulation in attic
- Less than 8" insulation in attic

Year Built:

- Built in the 1970's or earlier
- Built in the 1980's
- Built in the 1990's
- Built in 2000 or later

Furnace:

- Electric baseboard heat
- House has an old gas furnace
- House has a high efficiency furnace

Bathroom Fans:

- None
- Piped to interior
- Piped to exterior
- House has a central heat recovery ventilator

Kitchen Fan:

- None
- Piped to interior
- Piped to exterior
- House has a central heat recovery ventilator

Air Filter:

- No filter
- House has a basic fiberglass filter
- House has a pleated or electric filter

Figure -4 Home information input page

The candidate then proceeds into a series of yes or no questions that assists in determining the home environmental condition with respect to the patient's respiratory condition.

If the final screen output shown in Figure -5 identifies that the candidate is in a home that is very likely to be conducive to respiratory sickness (house score of 32+), then they proceed to the next step in the SIRAPP program.



HEALTH²

Based on the questionnaire answers, this preliminary assessment indicates your home is very likely to have an indoor environment that is conducive to respiratory sickness. Your house is considered a lower quality building type that is conducive to poor indoor environments if not kept clean and tidy with low occupancy levels.

Lower quality building types easily allow the development moisture condensation on cold surfaces such as the bottom of windows and mildew odours. Installing mechanical ventilation, air filtration, and double pane thermally broken windows will enhance your indoor air quality. House cleanliness and personal hygiene is extremely important. Excess storage and overcrowding also easily leads to poor indoor environments that can cause sickness. Seal Off open dirt crawlspaces and ensure they are vented to the Outside. Repair all water and plumbing leaks and sanitize those areas to reduce mold contamination.

You likely have respiratory sickness in your home that is magnified by poor and inadequate building systems. If you can't move to a better quality house type, keeping an extremely clean and tidy home is a must. Consult your doctor for preventative medicines. Clean moist surfaces (window sills, etc.) with soap and water or a fungal detergent regularly. Keep your indoor environment free Of cleaning chemicals. Further assessment by an Environmental Professional is highly recommended.

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Figure -5 HEALTH² output page

The HEALTH² tool can also be used as an education platform to instruct the candidate on appropriate indoor environments and the means to accomplish simple improvements to maintain or improve their indoor environment. The details become more relevant and are addressed after the candidate is formally approved for the program and is in the process of signing the social contract, but the instruction may also be a means of introducing the SIRAPP program and the candidate's necessary day to day involvement in the process.

5.5.4 SWOT analysis

Along with the expected benefits, the proposed SIRAPP, like any new program, would likely face challenges. The key conditions that can be predicted at this preliminary stage have been outlined below, based on a SWOT analysis of SIRAPP. SWOT is an acronym for Strength, Weakness, Opportunity, and Threat. It is a strategic planning technique used to ensure all factors are considered before launching a project or business venture (Humphrey 2005). It will be necessary for the program to address all these elements in its development and outreach to optimize success.

A) Strengths

- a. Lower health care and societal costs.
- b. Healthier public through disease reduction.
- c. Greater individual and societal wellbeing.
- d. Stable program structure.
- e. Dovetails with existing hospital processes.
- f. Resource reallocation to other diseases/ impact centres.
- g. Meets current Government of BC health care review process requirements to find and implement ways and means to cut health care costs for system sustainability.
- h. Helps to move this segment of healthcare further towards prevention methods and to reduce the need for reactive measures.

B) Weaknesses

- a. Although many PHCS professionals associate mold as a possible factor in ill health, its causal level impact on health has not been established by researchers, due to many other possible confounding factors. Therefore, the consideration of IAQ and therefore

- indoor environments in diagnosis has traditionally not been considered, and has to date precluded the opportunity for advancement in the existing medical system.
- b. The PHCS culture is reactive by nature and process. This can impede systems adjustment and personnel refocusing.
 - c. Homes are private domiciles authorities can't enter without permission.
 - d. Candidates historically require significant motivation to participate.
 - e. Candidate involvement is time consuming and routine altering.
 - f. Patients can become accustomed to and rely on emergency medical support.
 - g. Candidates may not meet or accept the ongoing requirements of the social contract.
 - h. Validation of cause and effect of the program may include hitherto unknown complicating factors and reporting bias.
 - i. A decision tree for ED staff to identify potential for environmental mold and dampness cause in respiratory distress has not been developed.
 - j. Environmental and medical confounding factors are numerous and bias relating to humans in the environment cannot be fully verified by existing studies.
 - k. It is human nature to oppose changes in the workplace (Kanter 2012).

C) Opportunities

- a. Long term, repetitive sustainable health care cost reduction.
- b. Increase in patient well-being.
- c. Program expansion into other possible reversible environmental respiratory diseases and health impacts.
- d. Assists in modifying reactive medical culture into a proactive culture.

- e. BC MoH are currently seeking innovative technologies and research to reduce overburdened provincial health budgets.

D) Threats

- a. The public have little appetite contracting with patients (private citizen vs. Public domain responsibilities), to remedy private property.
- b. The candidates have little interest in adapting lifestyles.
- c. The window of time to attract the BC MoH attention with this proposed SIRAPP is limited.

5.5.5 Monitoring the program

An appropriate method of program success measurement will be essential to ensure accurate and useful results. To ensure effectiveness, the variation in effects on the patient must be rigorously monitored for accuracy of results. Second, the quality and thoroughness of health authority assessment, record keeping, outcomes, and reported results are essential for program sustainability. The following program outputs must be measurable and be measured to ensure sustainability. Monitoring results would be in the form of feedback documentation and measurable conclusions. The following is a general outline with some detail on what might be expected for monitoring requirements. The initial program development phase would flesh out the operational details and expected outcomes, based on three required areas:

A) Financial

Based on social cost benefit analysis and achievement of the prime goals:

- 1) The program net present value (NPV) remains positive;
- 2) Initial cost payback in 1 year, and;
- 3) Benefit cost ratio $\gg 1$.

Statistical information on program and PHCS cost allocation, specifically cost reductions or variations, utilization and ED candidate capture rates, etc. is to be retrieved and analysed monthly during the first year of operation, and then perhaps reduced to bi-monthly or quarterly as the systems and expected results become commonly understood.

B) Program champion: corporate lead

Ministry of Health (MoH). It is proposed that the Ministry be responsible as champion and corporate lead to implement an efficient and thoroughly thought through program with a motivated team to ensure the start-up is free of setbacks and then adjust the program in the short term for optimal results. As noted earlier, there are alternative corporate lead models but this seems to be the most strategic and practical. This is a complicated and intricate process and requires a champion to ensure it gets off the ground well enough to develop towards its expectations. That requires clear process and program development. The internal corporate program development for the SIRAPP consists of:

- 1) Management reorganization and systems development including medical decision trees and reporting methods.
- 2) Methods to affect cultural change.
- 3) Workforce buy-in/transition/ reorganization and implementation.
- 4) Systems development, integration, and accounting.
- 5) A dedicated defined decision making process.
- 6) Consultation & approval process – Ministry, Health region, hospital, patients.
- 7) Improvements loop to support and measure innovation in aligning services with organizational goals.

Success will also be measured in part, by calculating the variation of conditions from baseline for actionable items, timelines, and deliverables using time study methods. A good project accounting system will address the various outputs designed to isolate the variables required to measure that success. The following are key output variables that require measuring.

C) Measurement methods and implementation and accounting for results.

1. The candidate level cost accounting method specifically broken down into the following categories is required for accurate cost accounting and output measurement:

a. Patient / candidate effects

1) Direct health care costs (per candidate)

- i. Doctor/ emergency room visits
- ii. Critical care and regular bed stay
- iii. Drugs

2. The business level cost accounting method is broken down into the following categories:

a. Health region effects (per candidate)

1) Program costs

2) Extent of reduction of patient health care demand (cost and utilization savings)

3) Cost benefit analysis results

4) Staff and physician impact

- i. Work regimen
- ii. Income
- iii. Well-being

5) Systems impact

6) Efficiencies

7) Effectiveness

3. The following components of SCBA can be isolated and calculated through further research:

a. Societal effects

1) Patient impact (per candidate)

- i. Lost productivity
- ii. Time off
- iii. Early retirement/ welfare
- iv. Special needs – community delivered
- v. Disability impact on patient service to community
- vi. Wellbeing translated into community involvement
- vii. Wellbeing translated into reduction of service requirements
- viii. Mortality

2) Family impact (per candidate)

- i. Caregiver loss of income
- ii. Patient disability impact on family
- iii. Special needs
- iv. Income impact (financial)

5.5.6 Securing program sustainability

The methods and measurables noted above to monitor the SIRAPP program are necessary to follow, but without sustainability the program may have a limited shelf life. Of the six pillars of sustainability introduced in section 5.3.3, securing an adequate funding model is essential. Sustainability for the SIRAPP is obtained through a continual positive NPV that is supported by the disease prevention and health promotion pillar that leverages the HEALTH² innovation

technology. SIRAPP draws its vital resources from measuring and accounting for the benefits as part of the program. This is similar to the insurance corporation of British Columbia's (ICBC) road improvement program, which contributes to crash zone improvements to reduce accident payouts for an ongoing accountable net financial benefit to the Corporation (Sayed and Leur 2009). This sustainable funding model has a 20 year proven track record. Towards this end, program sustainability is built on validating and presenting cost savings as a cash flow to the PHCS although it is rightly validating reduction in cost of care. Presenting the reduction as an income stream would be facilitated by the transfer of funds from asthma care to a budget account that can be drawn on to support other health care needs.

5.5.7 Pilot project

In order to validate the theory, to assist decision makers, and to work out the details and address any unforeseen conditions, a pilot project is recommended at the health region authority level. The design of the project would be representative, non-biased and scalable, and include a partnership with the authority for the conducting of site assessments. SIRAPP candidates would be drawn from an existing database of high-use asthmatics, and led through the process outlined in section 5.2. The cost for a one to two year pilot program is to be determined with the appropriate funding agency and should include University partner funding within a grad studies program at UBC. Success at one level can help to drive the program across the Province, then across Canada. The pilot program can be extended to large corporations with significant health care liabilities and who tend to run their own programs. Private corporations typically have less organizational inertia and bias to overcome, so might be a good initial step to consider for a pilot versus a pilot via the PHCS. Success at a private corporate level would lend additional lessons and evidence to minimize the cost of its implementation by the PHCS.

5.6 Summary

This chapter presented a sustainable environmental asthma prevention program concept, SIRAPP, suggested to be undertaken by the PHCS utilizing a prevention-based PHCS program structure outline that utilizes proactive decision making based on engineering risk assessment. Refer to Figure 5-2 to view the contrast between the SIRAPP program and the traditional PHCS asthma patient treatment protocol. The SIRAPP program is intended to provide healthier patients, better balanced health care provision, less burdened Governments, and overall relief to society as a whole. A pilot project has been proposed to the Ministry of Health task force on sustainability as a starting point to assist in the organic growth of the program concept into cornerstone development of an overall prevention based healthcare initiative for mold and dampness affected respiratory patients with reversible environmental disease characteristics. Consideration towards promoting initial SIRAPP pilots via private corporations has been made.