**Supplemental Materials**

Supplemental Document 1

**Literature Search Strategy (Medline)**

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| # | Search Statement |
| 1 | ("student-led" or "student led" or "student-assisted" or "student assisted" or "student run" or "student-run" or "student facilitated" or "student-facilitated").mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] |
| 2 | exp Students/ or exp Students, Health Occupations/ |
| 3 | exp "Delivery of Health Care"/ or exp Community Health Services/ |
| 4 | 1 AND 2 |
| 5 | 3 AND 4 |
| 6 | exp Evaluation Studies/ |
| 7 | exp Clinical Trial/ |
| 8 | exp Cohort Studies/ |
| 9 | exp Retrospective Studies/ |
| 10 | exp Comparative Study/ |
| 11 | exp Follow-Up Studies/ |
| 12 | exp "Outcome Assessment (Health Care)"/ or exp "Outcome and Process Assessment (Health Care) |
| 13 | exp Patient Satisfaction/ |
| 14 | exp "Costs and Cost Analysis"/ |
| 15 | exp "Quality of Health Care"/ or exp Health Status/ or exp "Quality of Life"/ |
| 16 | 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12 |
| 17 | 13 OR 14 OR 15 |
| 18 | 16 OR 17 |
| 19 | 5 AND 18 |

Supplemental Document 2

**Literature Search Strategy (CINAHL)**

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| # | Search Statement |
| S1 | "studentled" OR "student led" OR "student-led" OR "student assisted" OR student-assisted" OR "student run" OR "student-run" OR "student facilitated" OR "student-facilitated" |
| S2 | (MH "Students, Health Occupations+") |
| S3 | ((MH "Students, Health Occupations")) OR (S1 AND S2) |
| S4 | (MH "Health Care Delivery, Integrated") OR (MH "Health Care Delivery+" |
| S5 | ((MH "Health Care Delivery, Integrated") OR (MH "Health Care Delivery+")) AND (S3 AND S4) |
| S6 | (MH "Prospective Studies+") |
| S7 | (MH "Clinical Trials+") |
| S8 | (MH "Comparative Studies") |
| S9 | (MM "Postexposure Follow-Up") |
| S10 | (MH "Outcomes (Health Care)+") |
| S11 | ((MH "Outcomes (Health Care)+")) AND (S6 OR S7 OR S8 OR S9 OR S10) |
| S12 | (MH "Costs and Cost Analysis+") |
| S13 | (MH "Quality of Health Care+") |
| S14 | (MH "Quality of Life+") |
| S15 | (MH "Health Status+") |
| S16 | (S5 OR S12 OR S13 OR S14 OR S15) AND (S12 OR S13 OR S14 OR S15) |
| S17 | ((S5 OR S12 OR S13 OR S14 OR S15) AND (S12 OR S13 OR S14 OR S15)) AND (S11 OR S16) |
| S18 | (((S5 OR S12 OR S13 OR S14 OR S15) AND (S12 OR S13 OR S14 OR S15)) AND (S11 OR S16)) AND (S5 AND S17) |

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| Supplemental Document 3 | |  |
| **Literature Search Strategy (Scopus)** | | |
| # | Search Statement | |
| 1 | ( ( ( TITLE-ABS-KEY ( "studentled"  OR  "student led"  OR  "student-led"  OR  "student assisted"  OR  "student-assisted"  OR  "student run"  OR  "student-run"  OR  "student facilitated"  OR  "student-facilitated" ) )  AND  ( TITLE-ABS-KEY ( "Student\* "  AND  "Health occupation\*" ) ) )  AND  ( "Health Care Delivery\*" ) )  AND  ( ( "Prospective Stud\*"  OR  "Clinical Trial\*"  OR  "Comparative Stud\*"  OR  "Postexposure Follow-Up" )  AND  ( "health outcome\*"  OR  "Cost Analys\*"  OR  "Cost\*"  OR  "Quality of Health Care"  OR  "Quality of Life"  OR  "Health Status\*" ) ) | |

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| Supplemental Document 4  **Student-led Health Service Evaluations Inclusion Criteria** |
| * In a peer reviewed journal * Is not a review article * Describes a student-led health service and/or intervention * Intervention Impacts:   + Patients receiving student-led healthcare services as inpatients OR outpatients OR from community-based healthcare service. * Are established healthcare services that provide ongoing services and include one or more of the following characteristics:   + Provides continuity of care by providing ongoing healthcare services to the community,   + Exposes students to the operational environment of healthcare and/or clinical services. * Primary outcome focuses on evaluating one or more of the following elements:   + Patient Health Outcomes   + Patient Experience/Satisfaction   + Patient cost   + Provider cost   + Cost effectiveness * Evaluates the intervention (may be retrospective or prospective) by:   + Collecting pre-intervention and post-intervention data   OR   * + Comparing the intervention to a control (e.g. other models of care and/or types of healthcare services) |

Supplemental Document 5

**A Critical Appraisal Tool for assessing health service evaluations using the Institute of Healthcare Improvement’s Triple Aim Framework**

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**PART ONE – Principles of Measurement**

Part one of this critical appraisal tool, will ask a set of questions to enable the user to critically assess the selected measures of a healthcare system/service evaluation using the standards and principles identified by the National Quality Form’s criteria for the evaluation of quality measures, Bilheimer’s (2010) and Perstronsk’s (2010) measurement principles for evaluating population health metrics and the Triple Aim measurement principles, proposed by Stiefel and Nolan (2012).

**1.1.1 The need for a defined population**

* Does the evaluation articulate the methods of measurement, including how the target population was determined?
* If the evaluation focuses on a sub population, how is the sample size calculated and is this large enough for generalisability?
* Does the evaluation identify more than one population?
  + And if so, how does the evaluation apply measures to each of the identified populations?
* Does the evaluation articulate population characteristics including socioeconomic factors such as wealth and income; education, employment and occupation, family and social support; as well as disease burden and reasons for accessing care?

**1.1.2 The need to gather data over time**

* Are the points of measurement appropriate and sensitive enough to allow the evaluation to draw conclusions between common cause and special cause variation and/or to gain insight into the relationship between interventions and effects, and to better understand time lags between cause and effect?

**1.1.3 The need to distinguish between outcome measures and process measures and between population and project measures.**

* Does the population health measure focus on an outcome (e.g., morbidity, mortality, function, health-related quality of life) that is relevant to, or associated with, a national health goal/priority, the condition, population, and/or care being addressed?
  + If the chosen measure for population health is an intermediate outcome measure, is there evidence that supports that the chosen measure leads to improved health/avoidance of harm or cost/benefit?
* Does the chosen measure for patient experience have evidence that supports its use in the measurement of patient experience care for the specific population it applies it to?
* Is there evidence to support that selected outcome measures are reliable in that the measure results are repeatable, producing the same results a high proportion of the time when assessed in the same population in the same time period?
* Is there evidence to support that selected outcome measures are valid in that the measure reflects the quality of care provided, adequately distinguishing good and poor quality?

**1.1.4 The value of Benchmark data**

* The measure is well defined and precisely specified so it can be implemented consistently within and across organizations and allows for comparability?
* If multiple data sources/methods are allowed, there is demonstration they produce comparable results.
* Does the evaluation utilise a comparison site and or comparison data to effectively draw conclusions from their results?

**PART TWO – Measurement of the Triple Aim**

* 1. **Population Health Outcomes**

This section of the critical appraisal tool will ask a set of questions to enable the analysis of measurement tools used to assess health outcomes, looking specifically at how this approach to health outcome measurement fits into Evan and Standard’s (1990) Model of Population Health and how well this approach reflects the overall intentions of the Triple Aim Framework.

* Does the evaluation attempt to measure upstream factors, including the measurement of socioeconomic factors and physical environment?

Note: Socioeconomic factors can include: wealth and income; education, employment and occupation, family and social support. Factors within the Physical Environment can include: the build environment; the food environment, community safety and culture, the media/information environment and environment pollution.

* If Yes, discuss how this approach to measuring population health outcomes aligns with the overall aims of the Triple Aim framework and how this reflects the evaluation’s ability to assess health system/service impact on population health outcomes.
* Does the evaluation attempt to measure individual factors, including the measurement of individual factors including behavioral factors and physiological factors?

Note: Other areas of measurement associated with individual factors include genetic endowment, spirituality and resilience.

* If Yes, discuss how this approach to measuring population health outcomes aligns with the overall aims of the Triple Aim framework and how this reflects the evaluation’s ability to assess health system/service impact on population health outcomes.
* Does the evaluation attempt to measure intermediate health outcomes including disease burden?
* If Yes, discuss how this approach to measuring population health outcomes aligns with the overall aims of the Triple Aim framework and how this reflects the evaluation’s ability to assess health system/service impact on population health outcomes.
* Does the evaluation attempt to measure Health Outcomes (Downstream Factors) including a focus on Health and Function and/or Mortality?

Note: Other downstream factors that may be included in this type of measure include Quality of Life and Wellbeing.

* If Yes, discuss how this approach to measuring population health outcomes aligns with the overall aims of the Triple Aim framework and how this reflects the evaluation’s ability to assess health system/service impact on population health outcomes.

**2.2 Patient Experience of Care**

This section of the critical appraisal tool will ask a set of questions to enable the analysis of the ability of a health service evaluation to assess the Triple Aim dimension of experience care. This tool will look specifically at how well this approach to measurement fits into the IHI recommendations for evaluating experience of care from a patient’s perspective and the IOM’s six drivers of excellent care.

**2.2.1 Overall Experience of Care**

* Is overall experience of care measured?
* Is the assessment of overall experience of care assessed by the person who receives the care?
* How is this assessed? E.g. global experience questions from the patient, a member or a population survey?
  + 1. **IOM’s Six Aims of Improvement**
* Is the safety of services provided measured?
  + How is safety of healthcare assessed?

Note: Recommended Triple Aim measures for safety include:

* Rate of Adverse Events
* Incidence of Nonfatal Occupational Injuries and Illnesses
* Serious Reportable Events including product/device events, patient protection events, care management events, environmental events and/or potential criminal events.
* Is healthcare service effectiveness measured?
  + How is effectiveness measured?
  + Are the measures used to measure effectiveness reliable?

Note: Recommended Triple Aim measures for effectiveness include:

* Standardised mortality ratio
* Unadjusted Raw Mortality %
* Functional Health Outcome Measures
* % of hospital readmission.
* Reliability of Core Measures
* Is timeliness to access healthcare services measured?
  + How is timeless of healthcare services measured?

Note: Recommended Triple Aim measures for timeliness include:

* Days to Third Next Available Appointment
* Is the degree to which patients are involved in the direction of their own care measured?
  + How is patient-centeredness measured?

Note: Recommended Triple Aim measures for patient-centeredness include:

* Patient-clinician communication satisfaction
* Is efficiency of care measured?
  + How is healthcare efficiency measured?

Note: Recommended Triple Aim measures for effectiveness include:

* Hospital Days per Decedent during the Last Six Months of Life
* Are disparities in the healthcare system/service measured?
  + How is equity within the healthcare system/service measured?

Note: Equity is measured by stratifying all measures, when possible, into subpopulations that differentiate by gender, age, income, or racial groupings, for example.

**2.3 Cost of Healthcare**

This section of the Critical Appraisal Tool will ask a set of questions in relation to how cost is measured, how effective the approach to measuring costs is in capturing total cost and how well this approach reflects the overall intentions of the Triple Aim Framework.

* Does the evaluation measure costs associated with providing or receiving healthcare services?
  + If yes, from which lens does the evaluation use to guide the measuring of cost associated with healthcare:
* From a demand lens?
* From an intermediary lens?
* From a supply lens?
* If the evaluation looks at costs from a ‘demand’ lens, what does it measure?

Note: Triple Aim recommendations for measuring cost from a supply lens include:

* Healthcare provider costs such as:
  + Inpatient services
  + Outpatient facilities
  + Emergency department
  + Specialty services
  + Primary Care
  + Pharmacy
  + Other care provided
* Healthcare provider overhead/margin.
* If the evaluation looks at costs from an intermediary lens, what does it measure?

Note: Triple Aim recommendations for measuring cost from an intermediary lens include:

* Health plan costs
* Health plan overhead/margin
* If the evaluation looks at costs from and demand lens, what does it measure?

Note: Triple Aim recommendations for measuring cost from a demand lens include:

* Public/private insurance premiums
* Consumer out of pocket
* Public health expenditures
* Indirect costs such as absenteeism, presenteeism)

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