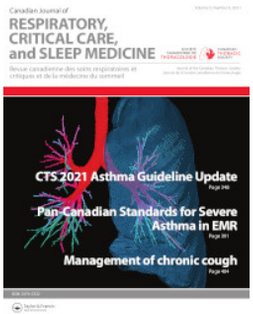

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ORIGINAL RESEARCH

Pan-Canadian standards for severe asthma in electronic medical records

M. Diane Lougheed[a], Alison Morra[a], Emma Bullock[a], Noah Tregobov[a], Dave Barber[b], Louis-Philippe Boulet[c], Sharon Dell[d], Francine M. Ducharme[e], Madonna Ferrone[f], J. Mark FitzGerald[g], Samir Gupta[h], Christopher Licskai[f,i], Delanya Podgers[j], Parameswaran Nair[k], Dhenuka Radhakrishnan[l], Mohsen Sadatsafavi[m], Itamar E. Tamari[n], Teresa To[o], Brandie Walker[p], Connie L. Yang[q] and Catherine Lemiere[r]

[a]Asthma Research Unit, Kingston Health Sciences Centre and Department of Medicine, Queen's University, Kingston, Ontario, Canada; [b]Department of Family Medicine, Queen's University, Kingston, Ontario, Canada; [c]Québec Heart and Lung Institute, Laval University, Québec City, Québec, Canada; [d]Department of Pediatrics, Child Health Evaluative Sciences, Hospital for Sick Children, University of Toronto, Ontario, Canada; [e]Departments of Pediatrics and of Social and Preventative Medicine, University of Montréal, Montréal, Québec, Canada; [f]Asthma Research Group Incorporated, Windsor, Ontario, Canada; [g]Respiratory Medicine Division, University of British Columbia and Vancouver General Hospital, Vancouver, British Columbia, Canada; [h]Li Ka Shing Knowledge Institute of St. Michael's Hospital, University of Toronto, Toronto, Ontario, Canada; [i]Department of Medicine, Western University, London, Ontario, Canada; [j]Department of Medicine, Kingston Health Sciences Centre, Kingston, Ontario, Canada; [k]Division of Respirology, Department of Medicine, McMaster University and St Joseph's Healthcare Hamilton, Ontario, Canada; [l]Division of Respirology, Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, Ontario, Canada; [m]Respiratory Evaluation Sciences Program, Collaboration for Outcomes Research and Evaluation, Faculty of Pharmaceutical Sciences, The University of British Columbia, Vancouver, British Columbia, Canada; [n]Stonegate Community Health Centre, Toronto, Ontario, Canada; [o]The Hospital for Sick Children, Research Institute and Dalla Lana School of Public Health, University of Toronto, Toronto, Ontario, Canada; [p]Division of Respirology, University of Calgary, Calgary, Alberta, Canada; [q]Division of Respiratory Medicine, British Columbia Children's Hospital, Vancouver, British Colombia, Canada; [r]Department of Medicine, University of Montréal, Montréal, Québec, Canada

ABSTRACT

RATIONALE: Integration of guidelines for severe asthma (SA) management into electronic medical records (EMRs) may greatly enhance asthma care and outcomes.

OBJECTIVES: We aimed: 1) to develop an algorithm to identify SA patients in primary care EMRs using pan-Canadian standardized data elements and decision support that prompts adherence with best practice guidelines and 2) to develop EMR data standards for SA for use primarily by specialists.

METHODS: A draft algorithm and list of elements were prepared, based upon the Canadian Thoracic Society criteria for suspected SA, Pan-Canadian Respiratory Standards Initiative for Electronic Health Records (PRESTINE) Asthma and Chronic Obstructive Pulmonary Disease (COPD) Working Group Report and published SA registries. Using a modified Delphi process, a working group (WG) of 18 experts voted on algorithm steps, elements and data definitions. Consensus was defined a priori as ≥ 60%. The algorithm, data elements and definitions were revised based on external stakeholder review.

MEASUREMENTS AND MAIN RESULTS: The WG devised a 4-step algorithm to identify SA and identified minor revisions to PRESTINE Core asthma elements necessary for the algorithm. PRESTINE Core asthma elements were deemed Core for SA. The WG identified 108 Core and 48 Optional elements for SA. Of those, 26 Core elements and 15 Optional elements were unique to SA.

CONCLUSIONS: An algorithm has been proposed that will identify SA patients in primary care EMRs based upon PRESTINE Core asthma elements. This initiative has also identified SA EMR elements for use primarily by specialists.

RÉSUMÉ

JUSTIFICATION: L'intégration de lignes directrices pour la prise en charge de l'asthme grave dans les dossiers médicaux électroniques (DME) peut grandement améliorer les soins et les issues de l'asthme.

OBJECTIFS: Nous visions : 1) à développer un algorithme pour répertorier les patients souffrant d'asthme grave dans les DME de soins primaires à l'aide d'éléments de données normalisées pancanadiennes et d'une aide à la décision qui encourage le respect des lignes directrices sur les meilleures pratiques et 2) élaborer des normes de données dans les DME pour l'asthme grave à l'usage principalement des spécialistes.

MÉTHODES: Une ébauche d'algorithme et une liste d'éléments ont été préparées, sur la base des critères de la Société canadienne de thoracologie pour l'asthme grave présumé, du rapport du Groupe de travail sur l'asthme et la MPOC de l'Initiative sur les normes respiratoires pancanadiennes pour les dossiers de santé électroniques (PRESTINE) et des registres publiés sur l'asthme grave. À l'aide d'un processus Delphi modifié, un groupe de travail de 18 experts a voté sur les étapes de l'algorithme et sur les définitions des éléments de données. Le consensus a été défini a priori

KEYWORDS
Asthma; severe asthma; electronic medical records; data standards

CONTACT M. Diane Lougheed mdl@queensu.ca Asthma Research Unit, Kingston Health Sciences Centre and Department of Medicine, Queen's University, 102 Stuart Street, Kingston, ON, Canada, K7L 2V6

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comme ≥ 60 %. L'algorithme et les définitions les éléments de données ont été révisés en fonction de l'examen des intervenants externes.
MESURES ET PRINCIPAUX RÉSULTATS: Le groupe de travail a conçu un algorithme en quatre étapes pour identifier l'asthme grave et a déterminé des révisions mineures des éléments essentiels de l'Initiative PRESTINE relatifs à l'asthme nécessaires à l'algorithme. Les éléments essentiels relatifs à l'asthme de l'Initiative PRESTINE ont été jugés essentiels pour l'asthme grave. Le groupe de travail a répertorié 108 éléments essentiels et 48 éléments facultatifs pour l'asthme grave. Parmi ceux-ci, 26 éléments essentiels et 15 éléments facultatifs étaient propres à l'asthme grave.
CONCLUSIONS: Un algorithme a été proposé pour repérer les patients souffrant d'asthme grave dans les DME de soins primaires sur la base des éléments essentiels relatifs à l'asthme de l'Initiative PRESTINE. Cette initiative a également recensé des éléments de DME pour l'asthme grave destinés principalement à l'utilisation par des spécialistes.

Introduction

Chronic respiratory diseases are among the top 3 leading causes of death from chronic disease in Canada and place a significant burden on the healthcare system. Asthma is one of the most common respiratory diseases affecting more than 3 million Canadians and is becoming increasingly prevalent.[1] SA affects approximately 5 to 10% of individuals with asthma, but accounts for 50% of asthma health costs.[2] The presence of care gaps between national evidence-based guidelines for the diagnosis and management of asthma[2,3] and actual clinical practice contribute to poor health outcomes[4,5] and highlight the importance of knowledge translation and implementation initiatives. Quality assurance, benchmarking and performance measurements are national healthcare priorities. The clinical use of electronic medical records (EMRs) and health records (EHRs) is becoming increasingly prevalent. An EMR is a digitalized medical record used clinically by a healthcare provider to document a patient's treatments and medical history. It is the equivalent to a patient paper chart typically used in an office setting. An EHR is also a digitalized medical patient record but is used in multiple clinical settings and shared by multiple authorized providers involved in the patient's care.[6] EMRs and EHRs offer unique opportunities to utilize best practice guidelines at the point of care.

The Pan-Canadian REspiratory STandards INitiative for Electronic Health Records (PRESTINE) was endorsed by the Canadian Thoracic Society (CTS) to validate a data-set of respiratory data elements for use in EMRs and EHRs enabling adherence to best practice guidelines, surveillance and outcomes monitoring.[7] In this context, data elements refer to variables or items in an EMR record, such as date of birth, sex, and smoking history. As the first initiative, an expert working group in asthma and chronic obstructive pulmonary disease (COPD) completed a modified Delphi process recommending asthma and related COPD data elements, as well as pulmonary function elements to be used in EMRs.[8]

The CTS recently published a Position Paper on the Recognition and Management of SA,[2] which includes a definition of SA and provides an approach to the assessment of suspected uncontrolled SA.[2] Following publication of this position paper, knowledge translation initiatives are warranted to facilitate implementation of the key messages. A key focus for primary care practitioners should be recognition of *suspected* SA and referral of those patients to specialists for a thorough evaluation to rule in or out SA, followed by phenotyping to guide subsequent management. It is a challenge for primary care practitioners to identify patients with SA among those they have already identified as having asthma. This may in part relate to lack of EMR data elements and tools to facilitate SA recognition. A knowledge translation tool incorporated into primary care EMRs that identifies SA patients and provides decision support (prompts for further assessment and referral to a specialist) may greatly enhance asthma care and outcomes. Additionally, development of SA data elements (and definitions) for inclusion in EMRs for primary care and SA clinics/specialists based upon the CTS position paper may enable adherence with evidence-based practice, performance evaluation and benchmarking. The objectives of the current initiative were: 1) to develop an algorithm to identify SA in primary care using standardized EMR data elements, and decision support which prompts adherence with the CTS SA position paper, including referral of patients with SA to an asthma specialist and 2) to identify EMR data elements and definitions for SA for use primarily by specialists.

Methods

A modified RAND-UCLA appropriateness and Delphi panel voting process was used to design and achieve consensus on data elements for an algorithm and decision support to identify SA patients and a standardized data set to be used in the management of SA. Ethics approval was obtained from the Queen's University and Affiliated Teaching Hospitals' Health Sciences Research Ethics Board.

Expert working group

A Working Group (WG) panel of 18 experts in the field of respiratory health, epidemiology and population health research from across Canada was convened. Members were selected from the PRESTINE WG and CTS Severe Asthma Position Paper authorship. Additional members were sought to ensure geographic diversity from SA clinics across the country. All except one person (pulmonary function standards expert) accepted the invitation to participate. The WG was comprised of 14 physicians including 8 respirologists, 4 pediatricians and 2 family physicians. Other healthcare

professionals included 1 nurse practitioner, 1 Registered Respiratory Therapist & Certified Respiratory Educator, 1 pharmacist and 1 asthma population health scientist. The working group recommended and engaged relevant external stakeholders to review and advise on the findings.

Data element selection

A broad list of proposed SA data elements was compiled from source documents identified in a literature review. Source documents included the Canadian Thoracic Society (CTS) Severe Asthma Position Paper,[2] 2018 PRESTINE Working Group report,[8] the International Severe Asthma Registry (ISAR) Modified Delphi Study publication[9] and the Severe Asthma Global Evaluation (SAGE) Electronic Platform for Severe Asthma publication.[10] Severe asthma and uncontrolled asthma, as defined in the CTS Severe Asthma Position paper,[2] were included in the data element list for voting. SA is defined by the CTS as "…asthma which requires treatment with high-dose ICS as outlined in Table 1 (adults and children) and a second controller for the previous year, or systemic corticosteroids for 50% of the previous year to prevent it from becoming 'uncontrolled,' or which remains 'uncontrolled' despite this therapy."[2]

Uncontrolled asthma is further defined by the CTS as at least 1 of the following:

1. Poor symptom control: as per Canadian Thoracic Society asthma control criteria or other standardized questionnaires: Asthma Control Questionnaire (ACQ) consistently > 1.5, Asthma Control Test (ACT) < 20, or Childhood Asthma Control Test (cACT) < 20
2. Frequent severe exacerbations: two or more courses of systemic corticosteroids (3 days each) in the previous year.
3. Serious exacerbations: at least one hospitalization, intensive care unit (ICU) stay or mechanical ventilation in the previous year.
4. Airflow limitation: forced expiratory volume in one second (FEV_1) < 80% of personal best (or < the lower limit of normal (LLN)), and a reduced FEV_1/forced vital capacity (FVC) defined as less than the LLN (after appropriate bronchodilator withhold).[2]

Severe asthma algorithm

Design of the algorithm was based upon the CTS criteria for suspected SA outlined in the 2017 CTS Severe Asthma Position Paper[2] and EMR elements outlined in the PRESTINE Asthma and COPD Working Group Report.[8]

Modified Delphi process and face-to-face consensus meeting

Following a modified Delphi process similar to that used in the PRESTINE project,[8] the Severe Asthma Expert WG completed independent assessments of potential data elements, through four rounds of voting including one in-person meeting. WG members rated potential data elements and response options (termed "sub-elements") as Core (C), Optional (O) and Exclude (E) for SA. Additionally, WG members were asked whether or not they agreed with the proposed definition/response option(s) for each data element, and to suggest revisions if they disagreed with the proposed definition.

Consensus on elements and definitions was defined a priori as ≥ 60% agreement among the working group, based on the number of votes for each element. Each subsequent round involved voting on contentious elements (defined as < 60% agreement) from the previous round, as well as clarifying definitions of the elements.

The first round consisted of two steps. Step 1 included the creation of an algorithm to identify suspected SA patients with decision support and a prompt to refer to a specialist. PRESTINE data elements for asthma were cross referenced with the 2017 CTS position paper definition for SA. Twenty-three PRESTINE data elements and 2 new data elements and definitions were proposed to be voted on for the algorithm.

Step 2 of the first round involved voting on data elements for a SA data set. A list of 452 elements was drafted, divided into 26 categories, including asthma diagnosis, severity and control. A total of 292 of these elements had been voted Core in PRESTINE for asthma and were therefore deemed a priori to also be Core for SA. The WG members were asked to vote on the remaining 160 elements, which included elements that had been voted as Optional for asthma in PRESTINE as well as new elements for consideration. Data elements and definitions that did not reach consensus were subsequently moved to the next round for further review, discussion and voting.

In Round 3, an in-person meeting was convened to achieve final consensus on the SA algorithm and data elements. This meeting was led by an expert group facilitator from the Queen's University Executive Decision Center, Smith School of Business. Sixteen out of 18 WG members were able to attend this face-to-face meeting. Working group members voted using an anonymous electronic voting system that calculated immediate consensus totals. Open discussion time was allocated for members to clarify, ask questions, and review supporting evidence pertinent to data elements being considered. The WG also deliberated on the number and order of steps in the algorithm.

The research team reviewed the finalized voting results, removed duplications and identified data elements remaining contentious. The algorithm steps and data elements, as well as a finalized SA data set were categorized and sent to the WG members for final review before being sent for stakeholder review.

The draft algorithm, elements and manuscript were sent for external stakeholder review. External stakeholders invited to review the documents included individuals with expertise in national and international SA registries, primary and tertiary care data standards and terminology, and health information and population health. Stakeholders included representatives from the Australian Severe Asthma Registry, Canada Health Infoway, the Canadian Institute for Health

Information (CIHI), the International Severe Asthma Registry, Ontario Health and The Lung Association – Ontario (TLA). Stakeholder participants independently completed an electronic survey to review all data elements and definitions, the overall coherence and comprehensiveness of the element list and propose revisions as needed. Participants were also asked to comment on the content and format of the draft manuscript. The research team collated and reviewed the feedback for inclusion.

Results

The first round of voting addressed the algorithm and 160 potential SA data elements. The results of each round are summarized in Figure 1.

After Step 1 of Round 1 (voting on the algorithm steps), the data elements and sequence of steps in the 4-step algorithm (Figure 2) achieved consensus (range: 94-100%). All of the related definitions for each data element step also achieved consensus (range: 72-100%). CTS asthma control criteria were unanimously deemed Core for the algorithm, while the validated asthma control questionnaires were deemed Optional. To be congruent with the CTS Severe Asthma Position Paper definitions,[2] the WG voted to amend 6 PRESTINE data elements definitions proposed for the algorithm from a time period of 2 years to 1 year, and to recommend these changes to the PRESTINE Steering Committee. These elements included: recent ED visits for asthma, recent or remote hospitalizations for asthma, recent or remote near fatal asthma episodes (Coma/Intubated/ICU/Increased CO_2) and total number of times systemic steroids used. Additionally, the WG voted to amend PRESTINE to add two new data sub-elements: systemic corticosteroid use for 50% of the previous year, and airflow limitation defined as $FEV_1 < 80\%$ personal best or < LLN for spirometry variables. The sequence of steps in the algorithm was discussed at the in-person meeting and subsequently finalized as illustrated in Figure 2. The definitions for asthma symptom and short-acting beta-agonist reliever used were subsequently updated to be congruent with the 2021 CTS asthma control criteria.[11]

In Step 2 of Round 1 (voting on data elements), consensus was reached for 106 of the 160 elements. Of these, 33 elements were voted Core, 69 were voted Optional and 4 were excluded. Additionally, 3 PRESTINE Core elements from the Comorbidities category were voted on in order to clarify definitions, and 3 elements from Smoking History were missed in the first round and voted on for the first time during the in-person meeting. The occupational health category from PRESTINE remained contentious after the first round and, therefore, was voted on during the in-person meeting. The 24 PRESTINE Core and 7 Optional Occupational History elements were deferred to be discussed during the Delphi panel as part of the Work-related Asthma Screening Questionnaire – Long version WRASQ(L)©.

In Round 2, the remaining 47 contentious elements were voted on again, 18 of which were able to reach consensus; 7 of these were voted as Core and 10 as Optional, while 1 was excluded. Five definition changes were accepted.

During Round 3 (the in-person Delphi meeting), 78 contentious data elements were voted on: 29 contentious

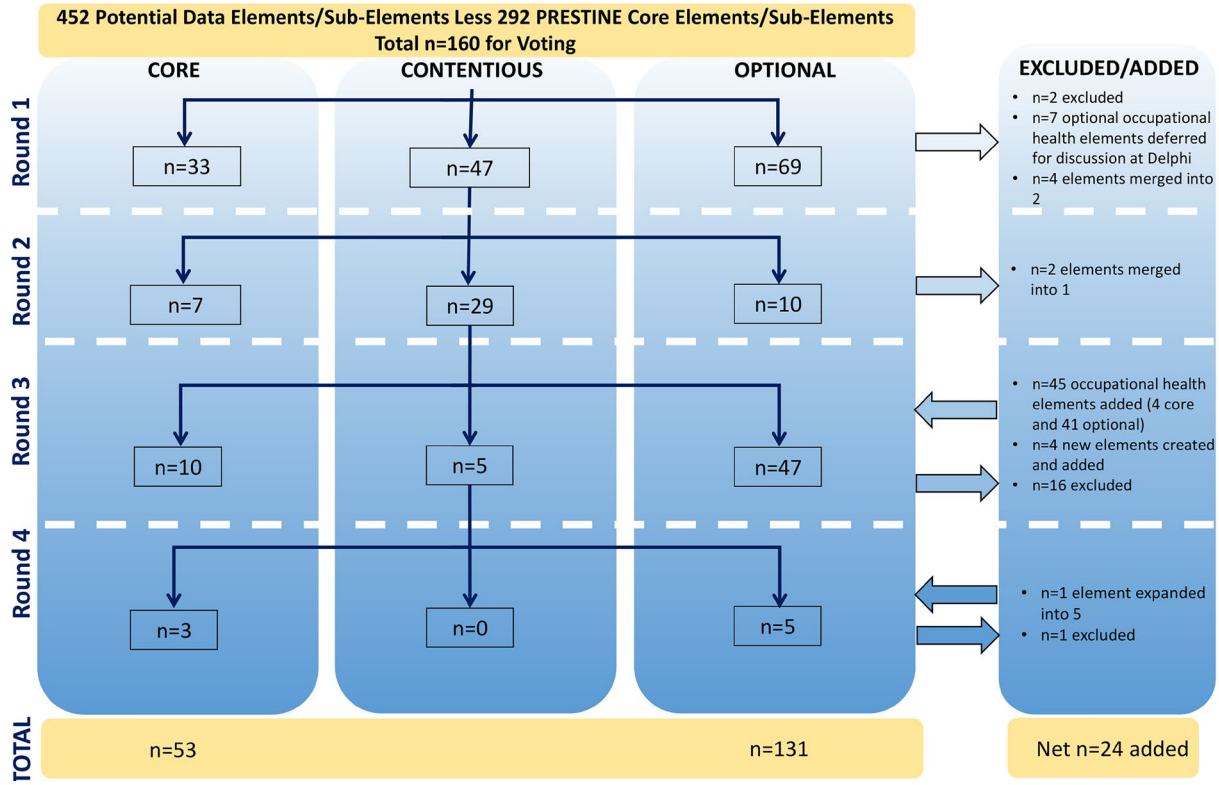

Figure 1. Flow diagram illustrating the data element selection process and outcomes of each of 4 voting rounds. The element list was revised based upon data definition review, external stakeholder review and categorization of response options as sub-elements.

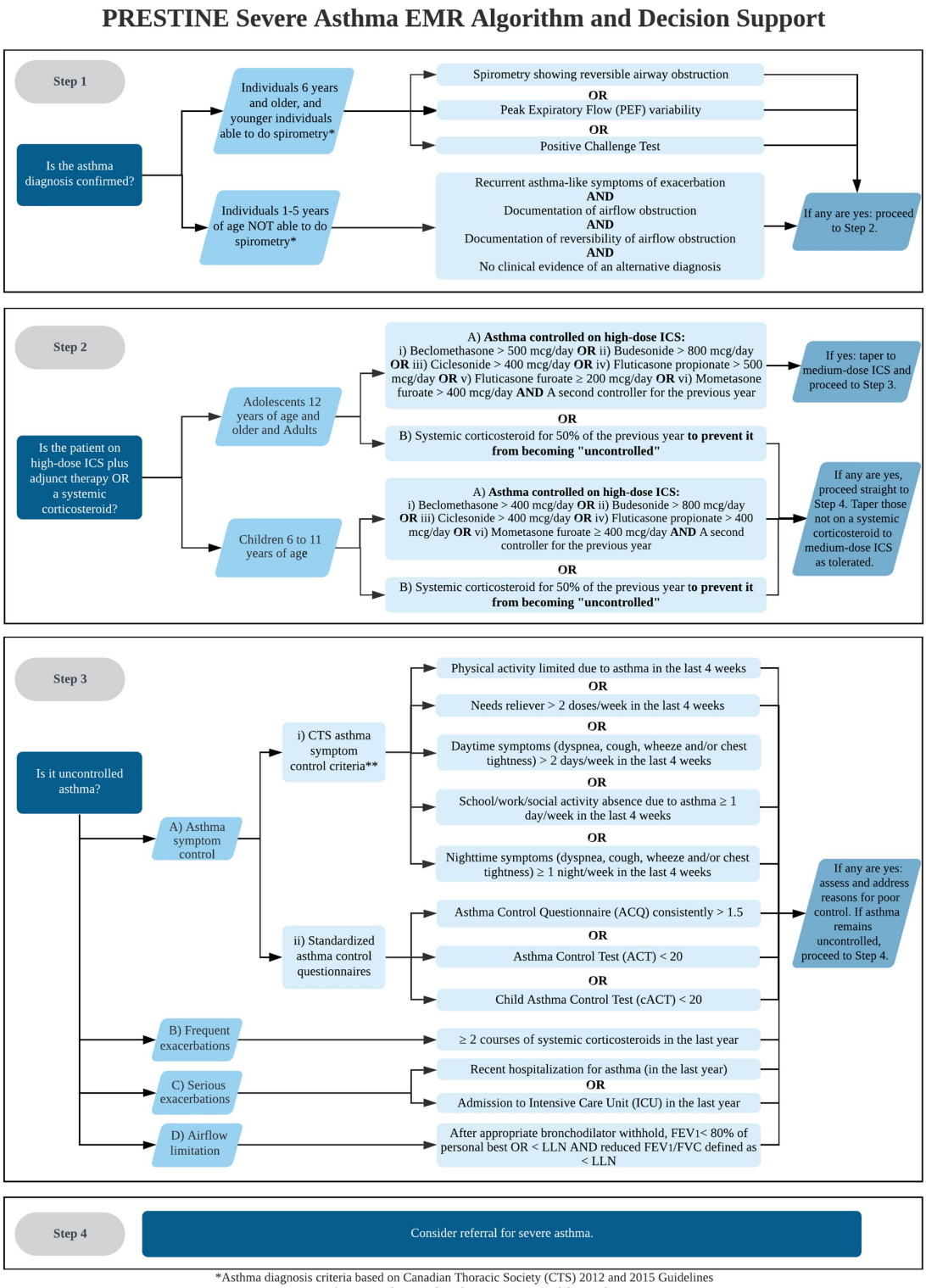

Figure 2. PRESTINE Severe Asthma Algorithm. To identify patients with severe asthma, Step 1 involves ensuring the asthma diagnosis is objectively confirmed based on Canadian Thoracic Society age-based criteria. Next, in patients with confirmed asthma, consider the medication needed to achieve and maintain asthma control (Step 2). Patients whose asthma is only controlled on high-dose inhaled corticosteroid (ICS) and a second controller, or systemic corticosteroid for 50% of the year, or whose asthma remains uncontrolled despite this therapy and attempts to address reasons for poor control (Step 3) have suspected severe asthma. Consider referring these patients to a specialist for further evaluation and management (Step 4).

elements from Round 2, 4 new elements recommended by the WG, and the 45 the Occupational Health elements. WG members voted that completion of the entire WRASQ(L)© was Optional. Of the 45 occupational health elements within this questionnaire, 4 were deemed Core and the remaining 41 Optional. Thus, of the 78 elements voted on in Round

3, 10 were voted Core, 47 were voted Optional and 16 were excluded, leaving just 5 contentious elements. Discussion at the Delphi meeting also facilitated the movement of certain elements between categories in order to ensure they were most sensibly placed.

Nine elements were discussed in the fourth and final round of voting: the 5 remaining contentious elements, one of which was split into 5 sub-elements. In addition, 2 of the 292 PRESTINE Core elements pertaining to second hand smoke exposure were reviewed due to redundancy with one of the 9 contentious elements. One of the PRESTINE Core elements was retained, one was recommended to be excluded from PRESTINE Core, and the contentious element was excluded. In addition, 2 definitions for elements voted Core in Round 3 (Cannabis use and Vaping) needed further clarification. After the fourth and final round of voting, all elements had reached consensus; 3 were voted Core, 5 were voted Optional and 1 was excluded. Additionally, the 2 contentious definitions were accepted. After round 4, 131 elements were voted Optional, and 53 elements were voted Core, including 4 elements that were added by the WG members at the Delphi meeting (see Figure 1).

The draft list was forwarded to stakeholders for review. Additional recommendations are being put forth to amend PRESTINE Asthma elements as follows: 1) remove 2 redundant Core sub-elements, both titled Secondhand smoke; 2) add three new Core elements, necessary for the SA algorithm: a) Systemic corticosteroid use for 50% of the previous year; b) Persistent airflow obstruction; and c) Childhood Asthma Control Test; 3) to revise the control parameters to be congruent with the 2021 CTS Asthma Guideline Update[11] and 4) revise time frame for health services utilization elements from 2 years or 12 months to all be 1 year.

External stakeholder review

A total of 7 of the 8 external stakeholders completed the review. One stakeholder sought additional input from 5 colleagues within their organization (Canada Health Infoway). CIHI undertook the review in the context of the Primary Health Care EMR Minimum Data Set v1.0.[12] Canada Health Infoway provided comments primarily from a terminology standards perspective, which will be the focus of next steps in the PRESTINE initiative, including selection of preferred coding systems (such as Systematized Nomenclature of Medicine-Clinical Terms [SNOMED CT®] and Logistical Observation Identifier Names and Codes [LOINC®]), and recommended French translation be undertaken.

The external stakeholders provided feedback relating to redundant elements, important missing elements, the categorical placement of elements and suggested edits to several definitions/permissible values. Members of the research team (DL, EB and AM) reviewed all stakeholder feedback. Data elements and definitions were revised accordingly to be internally consistent (eg, time frames), and congruent with Canadian standards. After careful consideration, 12 new elements were added (6 of which were Core or Optional elements for COPD in PRESTINE), 13 elements were excluded, 12 element names and 5 definitions/permissible values were changed, and 9 elements were moved to different categories. This led to the dissolution of 2 categories (Risk Factors and Diagnostics), the addition of 2 new categories (Triggers and Non-Pharmacologic Therapies) and 1 category name being changed (from Current Symptoms to Typical Symptoms). After all revisions were made, elements considered to be "response options" for other elements were categorized as "sub-elements." The final number of Core and Optional elements and sub-elements for SA are illustrated in Figure 3. The final list of elements, sub-elements and definitions/permissible values are listed in the Online Supplemental Appendix.

Discussion

Using a modified Delphi panel voting method as part of PRESTINE for SA, we have developed an algorithm that

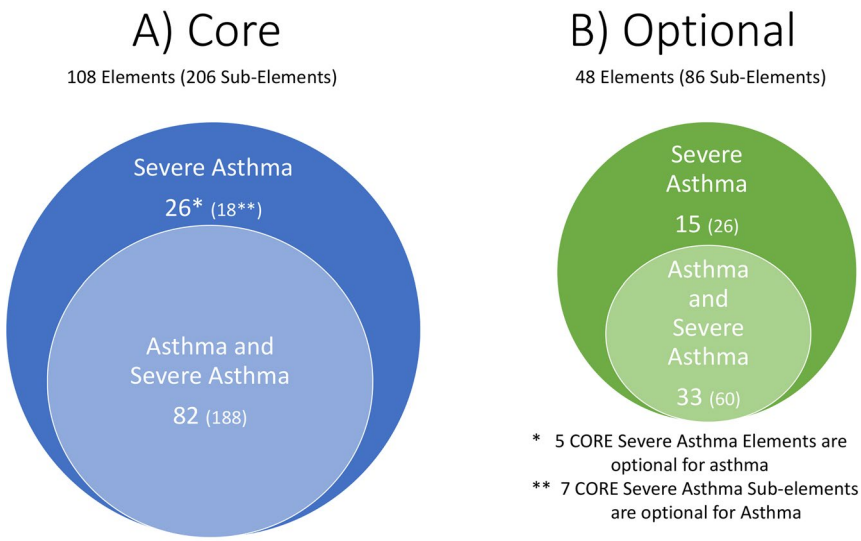

Figure 3. Venn diagrams illustrating the final number of A) Core and B) Optional elements and sub-elements for Severe Asthma, and the overlap with Core and Optional PRESTINE asthma elements and sub-elements.

can be incorporated into primary care EMRs to identify patients whose asthma may be severe. This algorithm provides decision support to assist primary care practitioners in further patient assessment, and to consider referring such patients to specialty care. Additionally, this initiative has created a SA data set of Core and Optional elements and sub-elements intended to be used primarily by specialists. An expert SA WG determined these elements support best practice guidelines for the assessment and management of suspected SA patients.

PRESTINE shares many commonalities with Severe Asthma Research Program (SARP),[13,14] ISAR[9,15] and SAGE.[10] The ultimate goal of all four initiatives is to improve recognition and management of SA through rigorous collection of detailed patient information, using standardized data definitions. Analyses of registry data, such as that recently published by ISAR[16] and SARP,[17] greatly contribute to our understanding of epidemiology of SA. The unique focus of PRESTINE is to identify and define elements for inclusion into certified EMR vendors in Canada such that data may be collected at the point of care, through the EMR, as it is being used for clinical care. While research is not the key focus of PRESTINE, the Steering Committee recognizes the potential of standardized data elements to drive more accurate measurements of both care and outcomes (as well as changes in these with various interventions), and the corresponding importance of congruency with international SA research registries (for external validity). With this in mind, we ensured that ISAR and SAGE elements and definitions were reviewed by our expert WG, and that experts familiar with those registries participated in the external stakeholder review.

The potential of EMRs to enable quality improvement has long been recognized.[18] In 2018, the PRESTINE Asthma and COPD Working Group Report[8] established a standardized data element set for asthma and COPD to be used in primary care EMRs/EHRs. The current SA initiative has utilized the published PRESTINE asthma data elements to create an algorithm to be used by primary care practitioners in their day-to-day practice to identify patients who may have SA. Xi et al.[19] demonstrated that algorithm searches in EMRs optimize the potential of EMRs, enabling physicians to identify patient populations, target care interventions and monitor patient outcomes. Healthcare providers can access data quickly, providing immediate decision support and facilitating evidence-based patient care.[20] This SA algorithm will support clinical evaluation of patients' symptoms and identification of patients with uncontrolled asthma, while prompting referrals of patients with SA to a respiratory specialist. It is important to note that there are additional indications for referral to an asthma specialist outlined in the CTS guidelines and position papers.[2,3,21] In many instances, particularly pediatrics, referral to a specialist is indicated at lower doses of inhaled corticosteroid and shorter duration of systemic corticosteroid than listed in the definition of SA, which this algorithm does not encompass. Implementation of this SA EMR algorithm and decision support has the potential to improve adherence with best practice guidelines, and patient outcomes, which is the focus of a research project currently in progress.

As patients receive care from many different providers and locations, a key component to standardized care is interoperability between EMRs, mobile health (mHealth) applications and other electronic tools.[7,21] Implementation of the PRESTINE Core and SA data elements will facilitate EMR and mHealth interoperability, and allow for the sharing of healthcare information between primary healthcare physicians and specialists. These elements may also be used to support mobile health apps used by patients, such as *breathe*,[22] and in electronic asthma management systems that support clinician decision making.[23] Optional elements may be used and incorporated into the EMR at the discretion of the end-user. Certain elements may be particularly relevant to certain practice settings/provider (physician versus nurse practitioner) or clinic setting/facility (tertiary care center with or without access to exhaled nitric oxide or induced sputum cell counts for example).

Initially, PRESTINE focused on the development of standardized data elements for asthma and COPD to be used in primary care EMRs.[8] In this work, we have established a SA data element set for specialist use in EMRs furthering the PRESTINE initiative by providing respiratory specialists with standardized means to document evidence-based care. Eighty-two percent of the PRESTINE SA data elements and definitions were adopted "as is" from the original PRESTINE initiative, including primary healthcare EMR content standards from the CIHI,[24] as well as smoking history, pulmonary function tests and medications, illustrating the relevance the original PRESTINE Core asthma data set has across many practice settings. Notably, assessment of airway inflammation in the evaluation of asthma severity, one of the CTS Asthma control criteria, was deemed Core in the SA data set.

The PRESTINE data elements considered Core for SA were previously cross-referenced with existing health terminology, specifically SNOMED CT® and LOINC®. We have not yet undertaken similar mapping of the unique SA data elements. We plan to continue collaborative work with federal and provincial health terminology experts at CIHI, Canada Health Infoway and Ontario Health to extend our previous work[25] and align the SA dataset with relevant health terminology.

A major strength of this initiative was convening an expert working group from various disciplines and geographic regions of Canada to participate in the Delphi panel consensus process. Members included physicians in primary care, adult and pediatric SA, asthma education, epidemiology, and population health research. Moreover, we incorporated an external stakeholder review process to evaluate the SA data set. Stakeholders included participants from international SA registries, national specialty societies and guideline panels, as well as data standard experts. Inclusion of experts from across Canada and from diverse disciplines contributed to the validity of our findings.

The main limitation of this initiative are the known limitations of Delphi panels and consensus groups.[26] The working group members' votes may have been influenced by familiarity with data collection tools and elements, as well as professional and personal biases. The face-to-face meeting format is susceptible to bias by participants with strong personalities who can dominate conversation and sway

opinion. Engaging the services of an independent facilitator who did not have clinical knowledge to moderate the face-to-face meeting diminished this limitation. It should also be noted that organizers can unintentionally exert influence when deciding which experts are invited to participate and/or how Delphi panel questions are worded.

We and others have previously recognized that standardization of data elements and associated data definitions are a critical first step if EMR data are to be used for performance measurement, surveillance and quality improvement.[20,25,27] Implementation of PRESTINE asthma and SA elements is the next step. This will require engagement of multiple stakeholders, including the organizations we engaged in this initiative, as well as end-users and EMR vendors. The optimal way to integrate data standards and digital tools into EMRs to enable adoption will require additional research.

In conclusion, this project sought expert opinion spanning multiple disciplines specializing in respiratory health care, SA, and data standards and created an algorithm for use in primary care EMRs. The algorithm outlines an approach to identify suspected SA patients, provides decision support and prompts referral to a respiratory specialist. Moreover, these experts participated in the development of a SA data set to be used in EMRs by specialists, based on published management guidelines and existing national and international databases. This Delphi panel consensus process lends itself to other chronic diseases, for developing comparable data sets, registries, or algorithms. We aim to collaborate with the CTS' PRESTINE Steering Committee and Asthma Clinical Assembly on implementation initiatives. Next steps will be to evaluate the real-world uptake of the elements, to program an electronic algorithm and validate its accuracy compared to a gold standard (asthma expert chart review) in one or more primary care EMRs, and to assess the impact of these tools on care quality and patient outcomes. If successful, a broad-scale implementation strategy for these core and SA data elements and the SA algorithm may be warranted.

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The opinions, results and conclusions reported are those of the authors and are independent from the provincial and territorial governments of Canada.

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ORCID

M. Diane Lougheed http://orcid.org/0000-0001-6387-8759
Noah Tregobov http://orcid.org/0000-0002-7901-8179
Louis-Philippe Boulet http://orcid.org/0000-0003-3485-9393
Francine M. Ducharme http://orcid.org/0000-0001-5096-0614
Dhenuka Radhakrishnan http://orcid.org/0000-0002-8637-1480

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