

mFI Delphi 1

Defining the ICD-10 variables required to calculate the modified frailty index using the Delphi Consensus: Survey-1

My name is Dr Ashwin Subramaniam. I am an intensive care specialist from Frankston Hospital, currently undertaking a PhD (Quantifying frailty in the critically ill) through Monash University.

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Purpose: To calculate the eleven co-morbidities modified frailty index (mFI) using the pertinent ICD-10 codes required to identify each of the eleven co-morbidities as an approximation. The ICD-10 codes were obtained from the Australian-Refined Diagnosis Related Groups (AR-DRG) upon patients' discharge from the hospital. We have included all possible ICD-10 codes pertinent to each of the 11 mFI variables.

Delphi Panel Members: On behalf of my co-authors, I request your help in this Delphi consensus process. You are one of the intensive care specialists and/or Geriatricians to be chosen as panel members. There may be about 3 to 4 surveys over the coming weeks, till we reach an 75% consensus for the possible ICD-10 codes that are absolutely required for each of the 11 mFI variables. I am seeking your help in this Delphi consensus process.

Delphi Survey: This is the first survey.

We need your help: To establish an appropriate set of ICD-10 codes that could be used in the mFI evaluation.

What it entails: For all of the survey questions, we have asked if the listed ICD-10 codes could be used to represent the mFI variable. We have also provided the actual definition that was used in NSQIP database. Kindly complete the survey by answering YES, NO or MAYBE against each ICD-10 variable.

Your participation: Participation is voluntary. By participating, you are providing consent for the study results to be used for publication. You will not receive any monetary benefits. You will be acknowledged in the manuscript as a Delphi Panel Member.

Only the researchers will be able to link your responses to your email address.

Time taken to complete the survey: Approximately 15-20 minutes

Background: Frailty, across adult age spectrum, is common in patients admitted to intensive care units (ICU), and patients with frailty generally have poorer outcomes. The validated clinical frailty scale (CFS) is the most commonly used scale in ICU patients globally. Frailty index-based assessment may be difficult to deliver by the critical care team on a routine basis. Shorter modified versions have been validated in other countries. The modified frailty index (mFI) was created by mapping eleven comorbidity variables contained within the National Surgical Quality Improvement Program (NSQIP) database contained within the original 70-item Canadian Study of Health and Ageing Frailty Index. The mFI was originally created for patients having surgery, but subsequently found to be predictive of increased mortality and length of stay in a large Brazilian cohort of critically ill patients. The mFI is calculated by allocating one point for each of the eleven co-morbidities (that encompasses previous medical events and functional capacity). The mFI categorises patients as non-frail if score=0-2, or frail if score is ≥ 3 .

The 11 variables that constitute the mFI are -

1. Functional status (not independent)
2. History of hypertension requiring medication
3. History of chronic obstructive pulmonary disease or pneumonia
4. History of impaired sensorium
5. History of diabetes mellitus
6. History of myocardial infarction
7. History of congestive heart failure
8. History of stroke with neurologic deficit
9. History of percutaneous angiographic intervention, angina or stenting
10. History of Peripheral vascular disease or ischemic rest pain
11. History of Transient ischaemic attack or stroke

However, nine of the eleven mFI items refer to medical co-morbidities that do not conform to the frailty 2011 expert consensus statement: "frailty is a multidimensional construct consisting of six domains (physical performance, gait speed, mobility, nutritional status, mental health, and cognition)". Moreover, two of the eleven mFI variables ('not independent of functional status' and 'impaired sensorium') did not have readily available ICD-10 codes. We have included all possible ICD-10 codes pertinent to each of the 11 mFI variables. We aim to refine these codes to establish an appropriate set of ICD-10 codes that could be used in the mFI evaluation.

We have provided the actual NSQIP definitions that was used for every variable. However, if need further clarification, please feel free to click the link below for the detailed NSQIP data dictionary.

https://www.facs.org/~media/Qles/quality%20programs/nsqip/nsqip_puf_userguide_2014.ashx

Please click the survey link here.

<https://docs.google.com/forms/d/17C4ykWeVIm8Hy1JyNnXECMImoX0vjv1JX1qYBdfHJ64/prefill>

On behalf of my co-authors, I thank you immensely for helping out. If you have any queries, please contact me ashwin.subramaniam@monash.edu

Email *

Valid email address

This form is collecting email addresses. [Change settings](#)

I am an *

Intensive Care Specialist

Geriatrician

Years of experience in your current role*

- <5 years
- 5-10 years
- 10-15 years
- >15 years

Variable 1: Please advise if these ICD-10 codes represent "Functional status (not independent)*". ACTUAL definition of the variable as designed which are found in the NSQIP data dictionary. This variable focuses on the patient's abilities to perform activities of daily living (ADLs) in the 30 days prior to surgery. Activities of daily living are defined as 'the activities usually performed in the course of a normal day in a person's life'. ADLs include bathing, feeding, dressing, toileting, and mobility. The best functional status demonstrated by the patient in the preceding 30 days. 1. Partially dependent: The patient requires some assistance from another person for activities of daily living. This includes a person who utilizes prosthetics, equipment, or devices but still requires some assistance from another person for ADLs. 2. Totally dependent: The patient requires total assistance for all activities of daily living. Note: All patients with psychiatric illnesses should be evaluated for their ability to function with or without assistance with ADLs just as the non-psychiatric patient. For instance, if a patient with schizophrenia is able to care for him/herself without the assistance of nursing care, he/she is considered independent. If there is a change in the patient's functional status, (i.e., improvement to worsening) within the 30 days prior to surgery, report the patient's best functional status.

	YES	NO	Maybe
Z73 – life management ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z73.6 – ADL dysfunction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z74 – Care-provider dep ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z74.1 – Need for assista ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z00-Z99 – problems/fac...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R26.0-R26.9 – Gait probl ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R27.0-R27.9 – Lack of c ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- | | | | |
|------------------------------|-----------------------|-----------------------|-----------------------|
| R41 – Sarcopaenia | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| R41.81 – age-related co... | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| R54 – age-related physic ... | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| W18 – Other fall on sam ... | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| W19 – Unspecified fall | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| L89 – Decubitus ulcer | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| R32 – Urinary incontinen ... | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| H54 – Blindness and low ... | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| R33 – Urinary retention | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| S72 – fracture of femur | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Variable 2: Please advise if these ICD-10 codes represent "History of hypertension requiring medication". *
 ACTUAL definition of the variable as designed,
 which are found in the NSQIP data dictionary. Hypertension (HTN) 140/90 mmHg
 or above most of the time." The diagnosis of HTN must be documented in the patient's medical
 record and the condition is severe enough that it requires antihypertensive medication in the
 preceding 30 days.

	YES	NO	Maybe
I10 – Essential hyperten...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I11 – Hypertensive heart...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I12 – Hypertensive kidne...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I13 – Hypertensive heart...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I15 – Secondary hyperte...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O10 – Pre-existing hyper...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O11 – Pre-eclampsia su...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O13 – Gestational hyper...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O14 – Pre-eclampsia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O15 – Eclampsia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I27 – Other pulmonary h...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I27.0 – primary pulmona...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I27.2 – Other secondary ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
U82.3 Hypertension	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Variable 3: Please advise if these ICD-10 codes represent "History of chronic obstructive pulmonary disease or pneumonia".

ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary.

Medical record must document that there is a historical or current diagnosis of COPD AND at least one of the following, in the preceding 30 days:

Functional disability from COPD (e.g., dyspnea, inability to perform ADLs) Or Requires chronic bronchodilator therapy with oral or inhaled agents or other medication specifically targeted to this disease



Multiple-choice grid ▾

Rows		Columns	
1. J44 – COPD	X	<input type="radio"/> YES	X
2. J09-J11 Influenza	X	<input type="radio"/> NO	X
3. J67 – Hypersensitivity pneumonitis	X	<input type="radio"/> Maybe	X
4. M05 – Rheumatoid lung disease	X	<input type="radio"/> Add column	
5. J12 – viral pneumonia	X		
6. J13 – pneumonia due to streptococcal pn ...	X		
7. J14 – pneumonia due to Haemophilus infl ...	X		
8. J15 – Bacterial pneumonia, not elsewhere ...	X		
9. J16 – Pneumonia due to other infectious ...	X		
10. J17 – Pneumonia in diseases classified ...	X		
11. J18 – Pneumonia, organism unspecified	X		
12. J43 – Emphysema	X		
13. J47 - Bronchiectasis	X		
14. J68 – Respiratory conditions due to inha ...	X		
15. J69 – Pneumonitis due to solids and liq ...	X		

- 16. J70 – Respiratory conditions due to oth... ✕
- 17. J84 – Other interstitial pulmonary disea... ✕
- 18. J85 – Abscesses of lung and mediastin... ✕
- 19. J90 – Pleural effusion ✕
- 20. J95 – Intraoperative and postprocedural... ✕
- 21. J96 – respiratory failure ✕
- 22. P23 – Congenital pneumonia ✕
- 23. U83 – Diseases of the respiratory system ✕
- 24. R06 - Abnormalities in breathing ✕
- 25. J98 – Other respiratory disorders ✕
- 26. Add row

Variable 4: Please advise if these ICD-10 codes represent "History of impaired sensorium". *
 ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. "YES" is entered if patient is acutely confused and/or delirious and responds to verbal and/or mild tactile stimulation. Patient is noted to have developed an impaired sensorium if they have mental status changes, and/or delirium in the context of the current illness. Patients with chronic or long-standing mental status changes secondary to chronic mental illness (e.g., schizophrenia) or chronic dementing illnesses (e.g., multi-infarct dementia, senile dementia of the Alzheimer's type) are not included.

	YES	NO	Maybe
F06 – Memory disturban...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G40.2 – Memory loss du...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G30 – Alzheimer’s Deme...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F01 – Vascular Dementia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A81.0 - CJD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

G20 - Parkinson's disease B22 - HIV

F04 – Organic Amnesia ...

F10 – Amnesia related t...

F11-F19 – Amnesia relat... F05 –

Delirium

F00-F03 – Delirium supe...

F10.4 – Delirium tremens

F30-F39 – Mood Disorder...

F20-F29 – Schizophrenia

F40-F48 – Neurotic disorder...

F50-F59 – Behavioural s... F60-F69 –

Personality di...

G01-G02 – Meningitis

G05 – Encephalitis-myelitis...

H25 – SENILE CATARACT

H26 – Other cataract

H90.3 – Sensorineural lo...

H90.3 – Conductive hear...

H90.6-H90.8 – Mixed he...

H54.9 – Vision impairment...

H35 – Macular degeneration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z51 – Other medical care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 5: Please advise if these ICD-10 codes represent "History of diabetes mellitus". *

ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. The treatment regimen of the patient’s chronic, long-term management (> 2 weeks). Diabetes mellitus requiring daily dosages of exogenous parenteral insulin or a non-insulin anti-diabetic agent to prevent a hyperglycemia/metabolic acidosis. Patients whose diabetes are controlled by diet alone are not included.

	YES	NO	Maybe
E09 - Intermediate hyper ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E10 - Type 1 diabetes m...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E11 - Type 2 diabetes m...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E13 – Other specified di ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E14 - Unspecified diabetes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6024. 410 - Gestational ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 6: Please advise if these ICD-10 codes represent "History of myocardial infarction". *
 ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary.
 "Yes" is entered for patients with a history of a non-Q wave or a Q wave infarct in the past six
 months as diagnosed in the patient's medical record.

	YES	NO	Maybe
I21 – Acute myocardial i ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I22 – Subsequent myoca ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I25 – Chronic ischaemic ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z86.7 – Personal history ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z82 - Family history of c ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I51 – Complications and ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I44 - Atrioventricular and ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I49 - Other cardiac arrhyt ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I45 - Other conduction di ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R00 – Abnormalities in h ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 7: Please advise if these ICD-10 codes represent "History of congestive heart failure". ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. Only newly diagnosed CHF within the previous 30 days or a diagnosis of chronic CHF with new signs or symptoms in the 30 days prior to surgery fulfills this definition.

	YES	NO	Maybe
I50 – Heart failure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
P29 – Cardiovascular di ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
U80.2 – Chronic heart fa ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I34 - Non-rheumatic mitr ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I35 - Non-rheumatic aort ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R60 – Oedema	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 8: Please advise if these ICD-10 codes represent "History of stroke with neurologic ^{*} deficit". ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. "YES" is entered if patient has sustained acute or chronic neuromuscular injury resulting in total or partial paralysis or paresis (weakness) of one side of the body. 'YES' is entered if the patient has hemiplegia/hemiparesis (that has not recovered or been rehabilitated) upon arrival to the OR. "YES" is entered, if there is hemiplegia or hemiparesis associated with a CVA/Stroke also.

	YES	NO	Maybe
I61 – Intracerebral haem...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I63 – Cerebral infarction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I69 – Sequelae of cerebr ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
U80 – Diseases of the n...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G00-G09 – Inflammatory ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G20-G26 – Extrapramid...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G22 – Parkinsonism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G07 – Intracranial absce...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 9: Please advise if these ICD-10 codes represent "History of Transient ischaemic attack^{*} or stroke without neurological deficit". ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. "YES" is entered if patient has transient ischemic attacks (TIAs). TIAs are focal neurologic deficits (e.g. numbness of an arm or amaurosis fugax) of sudden onset and brief duration (usually <30 minutes) that usually reflects dysfunction in a cerebral vascular distribution. These attacks may be recurrent and, at times, may precede a stroke.

	YES	NO	Maybe
G45 – Transient cerebral...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I64 – Stroke, not specifi ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 10: Please advise if these ICD-10 codes represent "History of percutaneous angiographic intervention, angina or stenting". *
 ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. "YES" is entered for patient who have undergone percutaneous coronary intervention (PCI) at any time (including any attempted PCI). This includes either balloon dilatation or stent placement. This does not include valvuloplasty procedures.

	YES	NO	Maybe
I20 – Angina pectoris	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z95 – Presence of cardi ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I71 - Aortic aneurysm an ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 11: Please advise if these ICD-10 codes represent "History of Peripheral vascular disease or ischemic rest pain". *
 ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. "YES" is entered for a patient with any type of angioplasty (including stent placement) or revascularization procedure for atherosclerotic peripheral vascular disease (PVD) (e.g., aorta-femoral, femoral-femoral, femoral-popliteal) or a patient who has had any type of amputation procedure for PVD (e.g., toe amputations, transmetatarsal amputations, below the knee or above the knee amputations). Patients who have had amputation for trauma or a resection of abdominal aortic aneurysms should not be included.

	YES	NO	Maybe
I70.2 - Atherosclerosis o ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I73.9 - Arteriospasm/An ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I77.9 - Peripheral arterial ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I77.1 - Obliterative perip ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I99.9 - Angiopathy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z89 - amputation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I73 - Peripheral vascular ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G46.8 - Other vascular s ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
T87 - complications fro ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I am an *

- Intensive Care Specialist
- Geriatrician

Years of experience in your current role*

- <5 years
- 5-10 years
- 10-15 years
- >15 years

Variable 1: Please advise if these ICD-10 codes represent "Functional status (not independent)*". ACTUAL definition of the variable as designed which are found in the NSQIP data dictionary. This variable focuses on the patient's abilities to perform activities of daily living (ADLs) in the 30 days prior to surgery. Activities of daily living are defined as 'the activities usually performed in the course of a normal day in a person's life'. ADLs include bathing, feeding, dressing, toileting, and mobility. The best functional status demonstrated by the patient in the preceding 30 days. 1. Partially dependent: The patient requires some assistance from another person for activities of daily living. This includes a person who utilizes prosthetics, equipment, or devices but still requires some assistance from another person for ADLs. 2. Totally dependent: The patient requires total assistance for all activities of daily living. Note: All patients with psychiatric illnesses should be evaluated for their ability to function with or without assistance with ADLs just as the non-psychiatric patient. For instance, if a patient with schizophrenia is able to care for him/herself without the assistance of nursing care, he/she is considered independent. If there is a change in the patient's functional status, (i.e., improvement to worsening) within the 30 days prior to surgery, report the patient's best functional status.

	YES	NO	Maybe
Z73 – life management ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z73.6 – ADL dysfunction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z74 – Care-provider dep ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z74.1 – Need for assista ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z00-Z99 – problems/fac ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R26.0-R26.9 – Gait probl ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

R27.0-R27.9 – Lack of c ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R41 – Sarcopaenia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R41.81 – age-related co ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R54 – age-related physic ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
W18 – Other fall on sam ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
W19 – Unspecified fall	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
L89 – Decubitus ulcer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R32 – Urinary incontinen ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H54 – Blindness and low ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R33 – Urinary retention	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
S72 – fracture of femur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 2: Please advise if these ICD-10 codes represent "History of hypertension requiring * medication". ACTUAL definition of the variable as designed,
 which are found in the NSQIP data dictionary. Hypertension (HTN) 140/90 mmHg
 or above most of the time." The diagnosis of HTN must be documented in the patient's medical record and the condition is severe enough that it requires antihypertensive medication in the preceding 30 days.

	YES	NO	Maybe
I10 – Essential hyperten ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I11 – Hypertensive heart ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I12 – Hypertensive kidne ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I13 – Hypertensive heart ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I15 – Secondary hyperte ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O10 – Pre-existing hyper ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O11 – Pre-eclampsia su ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O13 – Gestational hyper ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O14 – Pre-eclampsia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O15 – Eclampsia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I27 – Other pulmonary h ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I27.0 – primary pulmona ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I27.2 – Other secondary ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
U82.3 Hypertension	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 3: Please advise if these ICD-10 codes represent "History of chronic obstructive pulmonary disease or pneumonia". *
 ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. Medical record must document that there is a historical or current diagnosis of COPD AND at least one of the following, in the preceding 30 days: Functional disability from COPD (e.g., dyspnea, inability to perform ADLs) Or Requires chronic bronchodilator therapy with oral or inhaled agents or other medication specifically targeted to this disease Or Hospitalization in the past for treatment of COPD Or An FEV1 of <75% of predicted on a prior pulmonary function test (PFT). Patients whose only pulmonary disease is asthma, an acute and chronic inflammatory disease of the airways resulting in bronchospasm are not included. Patients with diffuse interstitial fibrosis, sarcoidosis, or silicosis are not included.

	YES	NO	Maybe
J44 – COPD			
J09-J11 Influenza	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J67 – Hypersensitivity p...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
M05 – Rheumatoid lung ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J12 – viral pneumonia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J13 – pneumonia due to...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J14 – pneumonia due to...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J15 – Bacterial pneumo...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J16 – Pneumonia due to...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J17 – Pneumonia in dise...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J18 – Pneumonia, organ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J43 – Emphysema	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J47 - Bronchiectasis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J68 – Respiratory condit...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J69 – Pneumonitis due t...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

J70 – Respiratory condit...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J84 – Other interstitial p...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J85 – Abscesses of lung...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J90 – Pleural effusion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J95 – Intraoperative and...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J96 – respiratory failure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
P23 – Congenital pneum...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
U83 – Diseases of the re...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R06 - Abnormalities in br...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 4: Please advise if these ICD-10 codes represent "History of impaired sensorium". *
 ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. "YES" is entered if patient is acutely confused and/or delirious and responds to verbal and/or mild tactile stimulation. Patient is noted to have developed an impaired sensorium if they have mental status changes, and/or delirium in the context of the current illness. Patients with chronic or long-standing mental status changes secondary to chronic mental illness (e.g., schizophrenia) or chronic dementing illnesses (e.g., multi-infarct dementia, senile dementia of the Alzheimer's type) are not included.

	YES	NO	Maybe
F06 – Memory disturban...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G40.2 – Memory loss du...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G30 – Alzheimer’s Deme...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F01 – Vascular Dementia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A81.0 - CJD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G20 - Parkinson’s disease	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B22 - HIV	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

F04 – Organic Amnesia ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F10 – Amnesia related t...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F11-F19 – Amnesia relat... F05 –	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Delirium	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F00-F03 – Delirium supe...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F10.4 – Delirium tremens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F30-F39 – Mood Disorde...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F20-F29 – Schizophrenia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F40-F48 – Neurotic disor...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F50-F59 – Behavioural s...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F60-F69 – Personality di...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G01-G02 – Meningitis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G05 – Encephalitis-myeli... H25 –	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SENILE CATARACT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H26 – Other cataract	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H90.3 – Sensorineural lo...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H90.3 – Conductive hear...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H90.6-H90.8 – Mixed he...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H54.9 – Vision impairme...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H35 – Macular degenera... Z51 –	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other medical care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 5: Please advise if these ICD-10 codes represent "History of diabetes mellitus". *

ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. The treatment regimen of the patient's chronic, long-term management (> 2 weeks). Diabetes mellitus requiring daily dosages of exogenous parenteral insulin or a non-insulin anti-diabetic agent to prevent a hyperglycemia/metabolic acidosis. Patients whose diabetes are controlled by diet alone are not included.

	YES	NO	Maybe
E09 - Intermediate hyper ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E10 - Type 1 diabetes m...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E11 - Type 2 diabetes m...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E13 - Other specified di ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E14 - Unspecified diabet ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6024. 410 - Gestational ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 6: Please advise if these ICD-10 codes represent "History of myocardial infarction". *
 ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary.
 "Yes" is entered for patients with a history of a non-Q wave or a Q wave infarct in the past six
 months as diagnosed in the patient's medical record.

	YES	NO	Maybe
I21 – Acute myocardial i ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I22 – Subsequent myoca ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I25 – Chronic ischaemic ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z86.7 – Personal history ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z82 - Family history of c ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I51 – Complications and ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I44 - Atrioventricular and ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I49 - Other cardiac arrhyt ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I45 - Other conduction di ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R00 – Abnormalities in h ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 7: Please advise if these ICD-10 codes represent "History of congestive heart failure". ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. Only newly diagnosed CHF within the previous 30 days or a diagnosis of chronic CHF with new signs or symptoms in the 30 days prior to surgery fulfills this definition.

	YES	NO	Maybe
I50 – Heart failure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
P29 – Cardiovascular di ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
U80.2 – Chronic heart fa ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I34 - Non-rheumatic mitr ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I35 - Non-rheumatic aort ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R60 – Oedema	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 8: Please advise if these ICD-10 codes represent "History of stroke with neurologic ^{*} deficit". ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. "YES" is entered if patient has sustained acute or chronic neuromuscular injury resulting in total or partial paralysis or paresis (weakness) of one side of the body. 'YES' is entered if the patient has hemiplegia/hemiparesis (that has not recovered or been rehabilitated) upon arrival to the OR. "YES" is entered, if there is hemiplegia or hemiparesis associated with a CVA/Stroke also.

	YES	NO	Maybe
I61 – Intracerebral haem...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I63 – Cerebral infarction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I69 – Sequelae of cerebr ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
U80 – Diseases of the n...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G00-G09 – Inflammatory ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G20-G26 – Extrapramid...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G22 – Parkinsonism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G07 – Intracranial absce...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 9: Please advise if these ICD-10 codes represent "History of Transient ischaemic attack^{*} or stroke without neurological deficit". ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. "YES" is entered if patient has transient ischemic attacks (TIAs). TIAs are focal neurologic deficits (e.g. numbness of an arm or amaurosis fugax) of sudden onset and brief duration (usually <30 minutes) that usually reflects dysfunction in a cerebral vascular distribution. These attacks may be recurrent and, at times, may precede a stroke.

	YES	NO	Maybe
G45 – Transient cerebral...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I64 – Stroke, not specifi ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 10: Please advise if these ICD-10 codes represent "History of percutaneous angiographic intervention, angina or stenting". *
ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. "YES" is entered for patient who have undergone percutaneous coronary intervention (PCI) at any time (including any attempted PCI). This includes either balloon dilatation or stent placement. This does not include valvuloplasty procedures.

	YES	NO	Maybe
I20 – Angina pectoris	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z95 – Presence of cardi ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I71 - Aortic aneurysm an ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Variable 11: Please advise if these ICD-10 codes represent "History of Peripheral vascular disease or ischemic rest pain". *
 ACTUAL definition of the variable as designed, which are found in the NSQIP data dictionary. "YES" is entered for a patient with any type of angioplasty (including stent placement) or revascularization procedure for atherosclerotic peripheral vascular disease (PVD) (e.g., aorta-femoral, femoral-femoral, femoral-popliteal) or a patient who has had any type of amputation procedure for PVD (e.g., toe amputations, transmetatarsal amputations, below the knee or above the knee amputations). Patients who have had amputation for trauma or a resection of abdominal aortic aneurysms should not be included.

	YES	NO	Maybe
I70.2 - Atherosclerosis o ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I73.9 - Arteriospasm/An ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I77.9 - Peripheral arterial ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I77.1 - Obliterative perip ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I99.9 - Angiopathy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z89 - amputation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I73 - Peripheral vascular ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G46.8 - Other vascular s ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
T87 - complications fro ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Defining the ICD-10 variables required to calculate the modified frailty index using the Delphi Consensus: Survey-2

My name is Dr Ashwin Subramaniam. I am an intensive care specialist from Frankston Hospital, currently undertaking a PhD (Quantifying the impact of frailty in the critically ill) through Monash University.

Lead Investigator: Dr. Ashwin Subramaniam

Associate Investigators: Ryo Ueno, Ravindranath Tiruvoipati, Jai Darvall, Velandai Srikanth, Michael Bailey, Rinaldo Bellomo, and David Pilcher

Purpose: To calculate the eleven co-morbidities modified frailty index (mFI) using the pertinent ICD-10 codes required to identify each of the eleven co-morbidities as an approximation. The ICD-10 codes were obtained from the Australian-Refined Diagnosis Related Groups (AR-DRG) upon patients' discharge from the hospital. We have included all possible ICD-10 codes pertinent to each of the 11 mFI variables.

Thank you for completing the Delphi Survey 1. We had a total of 21 responses from 13 Intensive care specialists and 8 Geriatricians. The collated results demonstrated only a 25% consensus. There were no statistical differences in the responses between geriatricians and intensivists. Please click this link to access the results of Delphi Survey 1.

<https://docs.google.com/spreadsheets/d/1OAIai941AkkLcLjOfkVaa5ybjofqOK0xyQGgH7YONBM/edit#gid=1777197197>

I've excluded those ICD-10 codes for this survey.

Many have answered 'Maybe'. In Delphi Round 2 I have removed the 'Maybe' option. We are hoping for a 'YES' and 'NO' from you. Please mark these ICD-10 codes as variables that represent a comorbidity variable rather than as a frailty marker.

As Delphi Panel Members, on behalf of my co-authors, I request your help again.

Delphi Survey: This is the second survey.

Your participation is voluntary. By participating, you are providing consent for the study results to be used for publication. You will not receive any monetary benefits. You will be acknowledged in the manuscript as a Delphi Panel Member.

Only the researchers will be able to link your responses to your email address.

Time taken to complete the survey: Approximately 10-15 minutes

Background: Frailty, across the adult age spectrum, is common in patients admitted to intensive care units (ICU), and patients with frailty generally have poorer outcomes. The validated clinical frailty scale (CFS) is the most commonly used scale in ICU patients globally. Frailty index-based assessment may be difficult to deliver by the critical care team on a routine basis. Shorter modified versions have been validated in other countries. The modified frailty index (mFI) was created by mapping eleven comorbidity variables contained within the National Surgical Quality Improvement Program (NSQIP) database contained within the original 70-item Canadian Study of Health and Ageing Frailty Index. The mFI was originally created for patients having

surgery but subsequently found to be predictive of increased mortality and length of stay in a large Brazilian cohort of critically ill patients. The mFI is calculated by allocating one point for each of the eleven co-morbidities (that encompasses previous medical events and functional capacity). The mFI categorises patients as non-frail if score=0-2, or frail if the score is ≥ 3 .

The 11 variables that constitute the mFI are -

1. Functional status (not independent)
2. History of hypertension requiring medication
3. History of chronic obstructive pulmonary disease or pneumonia
4. History of impaired sensorium
5. History of diabetes mellitus
6. History of myocardial infarction
7. History of congestive heart failure
8. History of stroke with neurologic deficit
9. History of percutaneous angiographic intervention, angina or stenting
10. History of Peripheral vascular disease or ischemic rest pain
11. History of Transient ischaemic attack or stroke

However, nine of the eleven mFI items refer to medical co-morbidities that do not conform to the frailty 2011 expert consensus statement: "frailty is a multidimensional construct consisting of six domains (physical performance, gait speed, mobility, nutritional status, mental health, and cognition)". Moreover, two of the eleven mFI variables ('not independent of functional status' and 'impaired sensorium') did not have readily available ICD-10 codes. We have included all possible ICD-10 codes pertinent to each of the 11 mFI variables. We aim to refine these codes to establish an appropriate set of ICD-10 codes that could be used in the mFI evaluation.

We have provided the actual NSQIP definitions that were used for every variable. However, if need further clarification, please feel free to click the link below for the detailed NSQIP data dictionary.

https://www.facs.org/~media/Qles/quality%20programs/nsqip/nsqip_puf_userguide_2014.ashx

Please click the survey link here.

https://docs.google.com/forms/d/1yajlasT_MXtds3eQDijE8PebNGA8vxJU2yKeMhEX3IA/edit

On behalf of my co-authors, I thank you immensely for helping out. If you have any queries, please contact me ashwin.subramaniam@monash.edu *Required

1. Email *

2. Variable 1: Please advise if these ICD-10 codes represent "Functional status (not independent)". 2 ICD-10 codes that obtained 75% consensus has been removed. *

Mark only one oval per row.

	Yes	No
[Z73 – life management difficulty]	<input type="radio"/>	<input type="radio"/>
[Z74.1 – Need for assistance]	<input type="radio"/>	<input type="radio"/>
[Z00-Z99 – problems/factors influencing health status and contact with health services]	<input type="radio"/>	<input type="radio"/>
[R26.0- R26.9 – Gait problems]	<input type="radio"/>	<input type="radio"/>
[R27.0 -R27.9 – Lack of coordination]	<input type="radio"/>	<input type="radio"/>
[R41 – Sarcopaenia]	<input type="radio"/>	<input type="radio"/>
[R41.81 – age-related cognitive decline]	<input type="radio"/>	<input type="radio"/>
[R54 – age-related physical disability]	<input type="radio"/>	<input type="radio"/>
[W18 – Other fall on same level]	<input type="radio"/>	<input type="radio"/>
[W19 – Unspecified fall]	<input type="radio"/>	<input type="radio"/>
[L89 – Decubitus ulcer]	<input type="radio"/>	<input type="radio"/>
[R32 – Urinary incontinence]	<input type="radio"/>	<input type="radio"/>
[H54 – Blindness and low vision]	<input type="radio"/>	<input type="radio"/>
[R33 – Urinary retention]	<input type="radio"/>	<input type="radio"/>
[S72 – fracture of femur]	<input type="radio"/>	<input type="radio"/>

3. Variable 2: Please advise if these ICD-10 codes represent "History of hypertension requiring medication". 6 ICD-10 codes that obtained 75% consensus has been removed. *

Mark only one oval per row.

	YES	NO
I10 – Essential hypertension	<input type="radio"/>	<input type="radio"/>
I15 – Secondary hypertension	<input type="radio"/>	<input type="radio"/>
O10 – Pre-existing hypertension in pregnancy	<input type="radio"/>	<input type="radio"/>
O11 – Pre-eclampsia superimposed on chronic hypertension	<input type="radio"/>	<input type="radio"/>
O13 – Gestational hypertension	<input type="radio"/>	<input type="radio"/>
I27.0 – primary pulmonary hypertension	<input type="radio"/>	<input type="radio"/>
I27.2 – Other secondary pulmonary Hypertension	<input type="radio"/>	<input type="radio"/>
U82.3 Hypertension	<input type="radio"/>	<input type="radio"/>

4. Variable 3: Please advise if these ICD-10 codes represent "History of chronic obstructive pulmonary disease or pneumonia". 7 ICD-10 codes that obtained 75% consensus has been removed. *

Mark only one oval per row.

	YES	NO
J12 – viral pneumonia	<input type="radio"/>	<input type="radio"/>
J13 – pneumonia due to streptococcal pneumoniae	<input type="radio"/>	<input type="radio"/>
J14 – pneumonia due to Haemophilus influenzae]	<input type="radio"/>	<input type="radio"/>
J15 – Bacterial pneumonia, not elsewhere classified	<input type="radio"/>	<input type="radio"/>

J16 – Pneumonia due to other infectious organisms	<input type="radio"/>	<input type="radio"/>
J17 – Pneumonia in diseases classified elsewhere	<input type="radio"/>	<input type="radio"/>
J18 – Pneumonia, organism unspecified	<input type="radio"/>	<input type="radio"/>
J47 - Bronchiectasis	<input type="radio"/>	<input type="radio"/>
J68 – Respiratory conditions due to inhalation of chemicals, gases, fumes, and vapours	<input type="radio"/>	<input type="radio"/>
J69 – Pneumonitis due to solids and liquids	<input type="radio"/>	<input type="radio"/>
J70 – Respiratory conditions due to other external agents	<input type="radio"/>	<input type="radio"/>
J95 – Intraoperative and postprocedural disorders of respiratory system, not elsewhere	<input type="radio"/>	<input type="radio"/>
J96 – respiratory failure	<input type="radio"/>	<input type="radio"/>
P23 – Congenital pneumonia	<input type="radio"/>	<input type="radio"/>
U83 – Diseases of the respiratory system	<input type="radio"/>	<input type="radio"/>
R06 - Abnormalities in breathing	<input type="radio"/>	<input type="radio"/>
J98 – Other respiratory disorders	<input type="radio"/>	<input type="radio"/>

5. Variable 4: Please advise if these ICD-10 codes represent "History of impaired sensorium". ICD-10 codes that obtained 75% consensus has been removed. *

Mark only one oval per row.

	YES	NO
F06 – Memory disturbance	<input type="radio"/>	<input type="radio"/>
G40.2 – Memory loss due to seizures	<input type="radio"/>	<input type="radio"/>
G30 – Alzheimer’s Dementia	<input type="radio"/>	<input type="radio"/>

F01 – Vascular Dementia	<input type="radio"/>	<input type="radio"/>
A81.0 - CJD	<input type="radio"/>	<input type="radio"/>
G20 - Parkinson's disease	<input type="radio"/>	<input type="radio"/>
F04 – Organic Amnesia Syndrome	<input type="radio"/>	<input type="radio"/>
F10 – Amnesia related to Alcohol	<input type="radio"/>	<input type="radio"/>
F11-F19 – Amnesia related to psychoactive agents	<input type="radio"/>	<input type="radio"/>
F10.4 – Delirium tremens	<input type="radio"/>	<input type="radio"/>
F50-F59 – Behavioural syndromes	<input type="radio"/>	<input type="radio"/>
G01-G02 – Meningitis	<input type="radio"/>	<input type="radio"/>
G05 – Encephalitis-myelitis	<input type="radio"/>	<input type="radio"/>
H90.3 – Sensorineural loss	<input type="radio"/>	<input type="radio"/>
H90.3 – Conductive hearing loss	<input type="radio"/>	<input type="radio"/>
H90.6-H90.8 – Mixed hearing loss	<input type="radio"/>	<input type="radio"/>
H54.9 – Vision impairment	<input type="radio"/>	<input type="radio"/>
H35 – Macular degeneration	<input type="radio"/>	<input type="radio"/>
Z51 – Other medical care	<input type="radio"/>	<input type="radio"/>

6. Variable 5: Please advise if these ICD-10 codes represent "History of diabetes mellitus". 1 ICD-10 code that obtained 75% consensus has been removed. *

Mark only one oval per row.

	YES	NO
E09 - Intermediate hyperglycaemia	<input type="radio"/>	<input type="radio"/>
E11 - Type 2 diabetes mellitus	<input type="radio"/>	<input type="radio"/>
E13 - Other specified diabetes mellitus	<input type="radio"/>	<input type="radio"/>
E14 - Unspecified diabetes mellitus	<input type="radio"/>	<input type="radio"/>
6024.410 - Gestational diabetes mellitus in pregnancy, diet controlled	<input type="radio"/>	<input type="radio"/>

7. Variable 6: Please advise if these ICD-10 codes represent "History of myocardial infarction" ICD-10 codes that obtained 75% consensus has been removed. *

Mark only one oval per row.

	YES	NO
I25 - Chronic ischaemic heart disease	<input type="radio"/>	<input type="radio"/>
Z86.7 - Personal history of diseases of circulatory system	<input type="radio"/>	<input type="radio"/>
I51 - Complications and ill-defined descriptions of heart disease	<input type="radio"/>	<input type="radio"/>
I44 - Atrioventricular and left bundle branch block	<input type="radio"/>	<input type="radio"/>
I49 - Other cardiac arrhythmias	<input type="radio"/>	<input type="radio"/>
I45 - Other conduction disorders	<input type="radio"/>	<input type="radio"/>
R00 - Abnormalities in heartbeat	<input type="radio"/>	<input type="radio"/>

8. Variable 7: Please advise if these ICD-10 codes represent "History of congestive heart failure". 75% Consensus was not obtained in any of these ICD-10 codes. *

Mark only one oval per row.

	YES	NO
I50 – Heart failure	<input type="radio"/>	<input type="radio"/>
P29 – Cardiovascular disorders originating in the perinatal period	<input type="radio"/>	<input type="radio"/>
U80.2 – Chronic heart failure	<input type="radio"/>	<input type="radio"/>
I34 - Non-rheumatic mitral valve disorder	<input type="radio"/>	<input type="radio"/>
I35 - Non-rheumatic aortic valve disorder	<input type="radio"/>	<input type="radio"/>
R60 – Oedema	<input type="radio"/>	<input type="radio"/>

9. Variable 8: Please advise if these ICD-10 codes represent "History of stroke with a neurological deficit". 75% Consensus was not obtained in any of these ICD-10 codes. *

Mark only one oval per row.

	YES	NO
I61 – Intracerebral haemorrhage	<input type="radio"/>	<input type="radio"/>
I63 – Cerebral infarction	<input type="radio"/>	<input type="radio"/>
I69 – Sequelae of cerebrovascular disease	<input type="radio"/>	<input type="radio"/>
U80 – Diseases of the nervous system	<input type="radio"/>	<input type="radio"/>
G00-G09 – Inflammatory diseases of CNS	<input type="radio"/>	<input type="radio"/>
G20-G26 – Extrapryramidal syndrome	<input type="radio"/>	<input type="radio"/>
G22 – Parkinsonism	<input type="radio"/>	<input type="radio"/>
G07 – Intracranial abscess	<input type="radio"/>	<input type="radio"/>

10. Variable 9: Please advise if these ICD-10 codes represent "History of Transient ischaemic attack or stroke without neurological deficit". 1 ICD-10 code that obtained 75% consensus has been removed. *

Mark only one oval per row.

	YES	NO
I64 – Stroke, not specified as haemorrhage or infarction	<input type="radio"/>	<input type="radio"/>

11. Variable 10: Please advise if these ICD-10 codes represent "History of percutaneous angiographic intervention, angina or stenting". 75% Consensus was obtained in 1 ICD-10 code.
 Mark only one oval per row.

	YES	NO
I20 – Angina pectoris	<input type="radio"/>	<input type="radio"/>
Z95 – Presence of cardiac and vascular implants and grafts	<input type="radio"/>	<input type="radio"/>

12. Variable 11: Please advise if these ICD-10 codes represent "History of Peripheral vascular disease or ischemic rest pain". 75% Consensus was not obtained in any of these ICD-10 codes. *
 Mark only one oval per row.

	YES	NO
I70.2 - Atherosclerosis of arteries of extremities	<input type="radio"/>	<input type="radio"/>
I73.9 - Arteriospasm / Angiospasm	<input type="radio"/>	<input type="radio"/>
I77.9 - Peripheral arterial insufficiency	<input type="radio"/>	<input type="radio"/>
I77.1 - Obliterative peripheral arteries	<input type="radio"/>	<input type="radio"/>
I99.9 - Angiopathy	<input type="radio"/>	<input type="radio"/>
Z89 - amputation	<input type="radio"/>	<input type="radio"/>
I73 - Peripheral vascular disease	<input type="radio"/>	<input type="radio"/>
G46.8 - Other vascular syndromes of brain in cerebrovascular diseases	<input type="radio"/>	<input type="radio"/>
T87 - complications from amputation	<input type="radio"/>	<input type="radio"/>

mFI Delphi 3 Survey

Thank you so much for being a Delphi panel member and completing the Delphi 2 survey. All 21 responses from 13 Intensive care specialists and 8 Geriatricians were analysed. The collated results demonstrated almost 70% consensus. Please click this link to access the results of Delphi Survey 2.

As Delphi Panel Members, on behalf of my co-authors, I request your help again. I promise this will be the last survey.

Purpose: To calculate the eleven co-morbidities modified frailty index (mFI) using the pertinent ICD-10 codes required to identify each of the eleven co-morbidities as an approximation. The ICD-10 codes were obtained from the Australian-Refined Diagnosis Related Groups (AR-DRG) upon patients' discharge from the hospital. We have included all possible ICD-10 codes pertinent to each of the 11 mFI variables.

Delphi Survey: This is the third and final survey. We will accept a majority rule, for those variables that have not reached a consensus. I've only included the 38 variables that we do not have a consensus on yet.

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In Delphi Round 3, I have introduced a 5-point Likert scale. Please mark these ICD-10 codes as variables that represent a comorbidity variable rather than as a frailty marker.

Your participation is voluntary. By participating, you are providing consent for the study results to be used for publication. You will not receive any monetary benefits. You will be acknowledged in the manuscript as a Delphi Panel Member.

Only the researchers will be able to link your responses to your email address.

The time taken to complete the survey is approximately 5-6 minutes

Background: Frailty, across the adult age spectrum, is common in patients admitted to intensive care units (ICU), and patients with frailty generally have poorer outcomes. The validated clinical frailty scale (CFS) is the most commonly used scale in ICU patients globally. Frailty index-based assessment may be difficult to deliver by the critical care team on a routine basis. Shorter modified versions have been validated in other countries. The modified frailty index (mFI) was created by mapping eleven comorbidity variables contained within the National Surgical Quality Improvement Program (NSQIP) database contained within the original 70-item Canadian Study of Health and Ageing Frailty Index. The mFI was originally created for patients having surgery but subsequently found to be predictive of increased mortality and length of stay in a large Brazilian cohort of critically ill patients. The mFI is calculated by allocating one point for each of the eleven co-morbidities (that encompasses previous medical events and

functional capacity). The mFI categorizes patients as non-frail if score=0-2, or frail if the score is ≥ 3 .

The 11 variables that constitute the mFI are -

1. Functional status (not independent)
2. History of hypertension requiring medication
3. History of chronic obstructive pulmonary disease or pneumonia
4. History of impaired sensorium
5. History of diabetes mellitus
6. History of myocardial infarction
7. History of congestive heart failure
8. History of stroke with neurologic deficit
9. History of percutaneous angiographic intervention, angina or stenting
10. History of Peripheral vascular disease or ischemic rest pain
11. History of Transient ischaemic attack or stroke

The results of Delphi 2 survey is available in this link.

<https://docs.google.com/spreadsheets/d/13esOlmyoJydgIp9RXv3mfrordEteaY6fInbRpDdWsUA/edit#gid=0>

We have provided the actual NSQIP definitions that were used for every variable. However, if need further clarification, please feel free to click the link below for the detailed NSQIP data dictionary.

https://www.facs.org/~media/Qles/quality%20programs/nsqip/nsqip_puf_userguide_2014.aspx

Please click the survey link here.

https://docs.google.com/forms/d/e/1FAIpQLSfnZitlvBPz7vEg7Q5JiNg7eb8AhyLmtNY5l2QBliu_VRChw/viewform

On behalf of my co-authors, I thank you immensely for helping out. If you have any queries, please contact me ashwin.subramaniam@monash.edu *Required

1. Email *
2. Variable 1 - "Functional status (not independent)": Do you think this ICD-10 code should be used as a comorbidity marker to define the mFI variable? *

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Z73 – life management difficulty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z74.1 – Need for assistance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z00-Z99 – problems/factors influencing health status and contact with health services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R26.0- R26.9 – Gait problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R27.0 -R27.9 – Lack of coordination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R41 – Sarcopaenia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R41.81 – age-related cognitive decline	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R54 – age-related physical disability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
W18 – Other fall on same level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
W19 – Unspecified fall	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
L89 – Decubitus ulcer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R32 – Urinary incontinence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H54 – Blindness and low vision	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R33 – Urinary retention	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Variable 2 - "History of hypertension requiring medication": Do you think this ICD-10 code should be in used as a comorbidity marker to define the mFI variable? *

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
O10 – Pre-existing hypertension in pregnancy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O11 – Pre-eclampsia superimposed on chronic hypertension	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
U82.3 Hypertension	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Variable 3 - "History of chronic obstructive pulmonary disease or pneumonia": Do you think this ICD-10 code should be in used as a comorbidity marker to define the mFI variable? *

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
J47 - Bronchiectasis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
P23 – Congenital pneumonia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Variable 4 - "History of impaired sensorium": Do you think this ICD-10 code should be in use as a comorbidity marker to define the mFI variable? *

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
G40.2 – Memory loss due to seizures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G20 - Parkinson's disease	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F10 – Amnesia related to Alcohol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F11-F19 – Amnesia related to psychoactive agents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F10.4 – Delirium tremens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G05 – Encephalitis-myelitis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H90.3 – Sensorineural loss	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H90.3 – Conductive hearing loss	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H90.6-H90.8 – Mixed hearing loss	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H54.9 – Vision impairment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H35 – Macular degeneration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Variable 5 - "History of diabetes mellitus": Do you think this ICD-10 code should be in used a a comorbidity marker to define the mFI variable? *

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
6024. 410 - Gestational diabetes mellitus in pregnancy, diet controlled	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Variable 8 - "History of stroke with the neurological deficit": Do you think this ICD-10 code should be in used as a comorbidity marker to define the mFI variable? *

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I69 – Sequelae of cerebrovascular disease	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Variable 9 - "History of TIA or stroke without neuro deficit": Do you think this ICD-10 code should be in used as a comorbidity marker to define the mFI variable? *

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I64 – Stroke, not specified as haemorrhage or infarction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. Variable 10 - "History of PCI, angina or stenting": Do you think this ICD-10 code should be in used as a comorbidity marker to define the mFI variable? *

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I20 – Angina pectoris	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z95 – Presence of cardiac and vascular implants and grafts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Variable 11 - "History of Peripheral vascular disease or ischemic rest pain": Do you think thi ICD-10 code should be in used as a comorbidity marker to define the mFI variable? *

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I73.9 - Arteriospasm / Angiospasm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I99.9 - Angiopathy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Z89 - amputation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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