

# Data collection materials

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# 1 Technical specifications of Integrated Care (IC) indicators

## IC1a. Ischemic Stroke – All-cause hospital readmissions within 365 days after discharge

1. **Purpose:** Readmissions to hospital among persons with a first-time ischemic stroke can provide an assessment of the secondary preventive interventions after stroke. These secondary preventative interventions include interventions that have an impact on lifestyle factors such as smoking cessation, dietary counselling, assistance with physical activity, as well as pharmacological therapy, carotid endarterectomy and other.
2. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time ischemic stroke. A first-time ischemic stroke is defined as an ischemic stroke among persons with no hospital admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for stroke from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess readmissions.
3. **Numerator:** The number of patients in the denominator who were readmitted to hospital for acute non-elective (urgent) care of any condition at least once within 365 days after date of discharge from the index episode of care. Elective admissions are excluded<sup>1</sup>.
4. **Denominator:** Number of persons discharged alive from hospital after acute non-elective (urgent) episode of care with a *primary diagnosis*<sup>2</sup> of a first-time ischemic stroke from 1 January to 31 December in the specified year [Ischemic stroke diagnostic codes upon separation: ICD-9: 433, 434, and 436 or ICD-10: I63-I64]. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of stroke [ICD-10: I60-I64 and I69] in previous 5 years are excluded. Day cases are also excluded.

<sup>1</sup> An **episode of care** is defined as a period of hospitalised care from the date of admission to a hospital to the date of discharge home (or to a nursing home or long term care), which excludes the counting of any hospital admissions that occurred during this period (either as a result of transferring a patient from one hospital to another or a nested admission) for the calculation of the patient based rates. (see Figure 9.1 in the general HCQO data guidelines).

<sup>2</sup> **Primary diagnosis (PDx)** follows one of two approaches:

- a. The PDx is the condition established after early clinical evaluation to be chiefly responsible for causing the hospitalisation (*'condition held chiefly responsible'* approach).
- b. The PDx is the diagnosis that is finally established to be the main reason for the hospital stay; that is demanding the most resources/medical effort over the course of the patients stay (*'condition demanding the most resources'* approach).

5. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns at ICD-10 level for codes I63 and I64 (or respectively ICD-9: 433, 434 and 436). Where possible, countries are welcomed to share data at subnational level.

### IC1b. Ischemic Stroke – Disease-specific hospital readmissions within 365 days after discharge

6. **Purpose:** Disease-specific hospital readmissions within 1-year post-discharge among persons with a first-time ischemic stroke can provide an assessment of the secondary preventive interventions after stroke. These secondary preventative interventions include interventions that have an impact on lifestyle factors such as smoking cessation, dietary counselling, assistance with physical activity, as well as pharmacological therapy, carotid endarterectomy and other.

7. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time ischemic stroke. A first-time ischemic stroke is defined as an ischemic stroke among persons with no hospital admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for any type of stroke from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess readmission.

8. **Numerator:** Number of patients in the denominator who were readmitted to hospital for acute non-elective (urgent) in-patient care at least once within 365 days with stroke or late effects (sequelae) of stroke as the primary diagnosis. [ICD-10: I60-I64 and I69].

9. **Denominator:** Number of persons discharged alive from hospital after acute non-elective (urgent) episode of care with a *primary diagnosis* of a first-time ischemic stroke from 1 January to 31 December in the specified year [Ischemic stroke diagnostic codes upon separation: ICD-9: 433, 434, and 436 or ICD-10: I63-I64]. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of stroke [ICD-10: I60-I64 and I69] in previous 5 years are excluded. Day cases are also excluded.

10. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns at ICD-10 level for codes I63 and I64 (or respectively ICD-9: 433, 434 and 436). Where possible, countries are welcome to share data at subnational level.

### IC2. Ischemic Stroke – All-cause mortality within 365 days after discharge

11. **Purpose:** Deaths within 1-year post-discharge among persons with a first-time ischemic stroke can provide an assessment of the secondary preventive interventions after stroke. These secondary preventative interventions include interventions that have an impact on lifestyle factors such as smoking cessation, dietary counselling, assistance with physical activity, as well as pharmacological therapy, carotid endarterectomy and other.

12. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time ischemic stroke. A first-time ischemic stroke is defined as an ischemic stroke among persons with no hospital admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for any type of stroke from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess mortality.

13. **Numerator:** Number of deaths within 365 days after discharge among those cases meeting the inclusion and exclusion rules for the denominator.

14. **Denominator:** Number of persons discharged alive from hospital after acute non-elective (urgent) episode of care with a *primary diagnosis* of a first-time ischemic stroke from 1 January to 31 December in the specified year [Ischemic stroke diagnostic codes upon separation: ICD-9: 433, 434, and 436 or ICD-10: I63-I64]. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of stroke [ICD-10: I60-I64 and I69] in previous 5 years are excluded. Day cases are also excluded.

15. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns at ICD-10 level for codes I63 and I64 (or respectively ICD-9: 433, 434 and 436). Where possible, countries are welcome to share data at subnational level.

### IC3a. Ischemic Stroke – Mortality or all-cause readmission within 365 days after discharge

16. **Purpose:** Death or readmission within 1-year post-discharge among persons with a first-time ischemic stroke can provide an assessment of the secondary preventive interventions after stroke. These secondary preventative interventions include interventions that have an impact on lifestyle factors such as smoking cessation, dietary counselling, assistance with physical activity, as well as pharmacological therapy, carotid endarterectomy and other.

17. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time ischemic stroke. A first-time ischemic stroke is defined as an ischemic stroke among persons with no hospital admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for any type of stroke from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess mortality and readmissions.

18. **Numerator:** The number of patients in the denominator who died within 365 days after discharge from the index episode of care or who were readmitted to hospital for acute non-elective (urgent) care of any condition at least once within 365 days after discharge from the index episode of care. If a patient was readmitted and died in the specified period, this patient should be counted only once.

19. **Denominator:** Number of persons discharged alive from hospital after acute non-elective (urgent) episode of care with a *primary diagnosis* of a first-time ischemic stroke from 1 January to 31 December in the specified year [Ischemic stroke diagnostic codes upon separation: ICD-9: 433, 434, and 436 or ICD-10: I63-I64]. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of stroke [ICD-10: I60-I64 and I69] in previous 5 years are excluded. Day cases are also excluded.

20. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns at ICD-10 level for codes I63 and I64 (or respectively ICD-9: 433, 434 and 436). Where possible, countries are welcome to share data at subnational level.

### IC3b. Ischemic Stroke – Mortality or disease-specific readmission within 365 days after discharge

21. **Purpose:** Death or readmission within 1-year post-discharge among persons with a first-time ischemic stroke can provide an assessment of the secondary preventive interventions after stroke. These secondary preventative interventions include interventions that have an impact on lifestyle factors such as smoking cessation, dietary counselling, assistance with physical activity, as well as pharmacological therapy, carotid endarterectomy and other.

22. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time ischemic stroke. A first-time ischemic stroke is defined as an ischemic stroke among persons with no hospital admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for any type of stroke from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess mortality and readmissions.

23. **Numerator:** The number of patients in the denominator who died within 365 days after discharge from the index episode of care or who were readmitted to hospital for acute non-elective (urgent) in-patient care at least once within 365 days with stroke or late effects (sequelae) of stroke as the primary diagnosis. [ICD-10: I60-I64 and I69.] If a patient was readmitted and died in the specified period, this patient should be counted only once.

24. **Denominator:** Number of persons discharged alive from hospital after acute non-elective (urgent) episode of care with a *primary diagnosis* of a first-time ischemic stroke from 1 January to 31 December in the specified year [Ischemic stroke diagnostic codes upon separation: ICD-9: 433, 434, and 436 or ICD-10: I63-I64]. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of stroke [ICD-10: I60-I64 and I69] in previous 5 years are excluded. Day cases are also excluded.

25. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns at ICD-10 level for codes I63 and I64 (or respectively ICD-9: 433, 434 and 436). Where possible, countries are welcome to share data at subnational level.

#### IC4. Ischemic Stroke - Prescribed antihypertensive medicines between 12 and 18 months after ischemic stroke

26. **Purpose:** High blood pressure is the single most important risk factor for stroke - both ischemic stroke and cerebral haemorrhage. The risk of a new stroke or of other cardiovascular diseases is also increased for people with high blood pressure. Therefore, treatment with antihypertensive medicines is one of the most important therapies after stroke. As the indicator measures pharmacological therapy between 12 and 18 months after the acute care for stroke, it is a measure of secondary prevention outside the hospital.

27. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived 18-months after a first-time, acute, non-elective (urgent) episode of care for ischemic stroke. A first-time ischemic stroke is defined as an ischemic stroke among persons with no hospital admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for any type of stroke from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess prescriptions.

28. **Numerator:** The number of stroke cases in the denominator with at least one prescribed antihypertensive medicine from the list below within the 182 day (i.e. 6-month) time window between 12 months and 18 months after the hospital discharge date of the first-time episode of care for ischemic stroke. To clarify: For patients discharged alive in the year 2018, prescription data for both 2019 and the first 6 months of 2020 is needed to follow all discharged cases in a time interval of day 365 to day 547 after discharge.

29. Antihypertensive medicines, ATC codes:

- Alpha-blocker and Methyldopa, C02
- Diuretics, C03
- Beta blockers C07
- Calcium channel blockers, C08

- Renin-angiotensin-aldosterone system (RAAS) inhibitors (N.B. includes Angiotensin Converting Enzyme inhibitors, ACE inhibitors; Angiotensin Receptor Blockers, ARB), C09

30. **Denominator:** Number of persons discharged alive from hospital for acute non-elective (urgent) care with a *primary diagnosis* of a first-time ischemic stroke from 1 January to 31 December in the specified year discharged from hospital and surviving 18 months after discharge [Ischemic stroke diagnostic codes upon separation: ICD-9: 433, 434, and 436 or ICD-10: I63-I64]. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years are excluded.

31. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns at ICD-10 level for codes I63 and I64 (or respectively ICD-9: 433, 434 and 436). Where possible, countries are welcome to share data at subnational level.

### IC5a. Hemorrhagic Stroke – All-cause hospital readmissions within 365 days after discharge

32. **Purpose:** Readmissions to hospital among persons with a first-time hemorrhagic stroke can provide an assessment of the secondary preventive interventions after stroke. These secondary preventative interventions include interventions that have an impact on lifestyle factors such as smoking cessation, dietary counselling, assistance with physical activity, as well as pharmacological therapy, carotid endarterectomy and other.

33. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time hemorrhagic stroke. A first-time hemorrhagic stroke is defined as a hemorrhagic stroke among persons with no hospital admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for stroke from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess readmissions.

34. **Numerator:** The number of patients in the denominator who were readmitted to hospital for acute non-elective (urgent) care of any condition at least once within 365 days after discharge from the index episode of care. Elective admissions are excluded.

35. **Denominator:** Number of persons discharged alive from hospital for acute non-elective (urgent) care with a *primary diagnosis* of a first-time hemorrhagic stroke from 1 January to 31 December in the specified year [Hemorrhagic stroke diagnostic codes upon separation: ICD-9: 430-432 or ICD-10: I60-I62]. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of stroke [ICD-10: I60-I64 and I69] in previous 5 years are excluded. Day cases are also excluded.

36. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns at ICD-10 level for codes I60, I61 and I62 (or respectively ICD-9: 430-432). Where possible, countries are welcomed to share data at subnational level.

### IC5b. Hemorrhagic Stroke – Disease-specific hospital readmissions within 365 days after discharge

37. **Purpose:** Disease-specific hospital readmissions within 1-year post-discharge among persons with a first-time hemorrhagic stroke can provide an assessment of the secondary preventive interventions after stroke. These secondary preventative interventions include interventions that have an impact on lifestyle factors such as smoking cessation, dietary counselling, assistance with physical activity, as well as pharmacological therapy, carotid endarterectomy and other.

38. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time hemorrhagic stroke. A first-time hemorrhagic stroke is defined as a hemorrhagic stroke among persons with no hospital admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for any type of stroke from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess readmissions.

39. **Numerator:** Number of patients in the denominator who were readmitted to hospital for acute non-elective (urgent) care at least once within 365 days after discharge with stroke or late effects (sequelae) of stroke as the primary diagnosis. [ICD-10: I60-I64 and I69.]

40. **Denominator:** Number of persons discharged alive from hospital for acute non-elective (urgent) care with a *primary diagnosis* of a first-time hemorrhagic stroke from 1 January to 31 December in the specified year [Hemorrhagic stroke diagnostic codes upon separation: ICD-9: 430-432 or ICD-10: I60-I62]. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of stroke [ICD-10: I60-I64 and I69] in previous 5 years are excluded. Day cases are also excluded.

41. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns at ICD-10 level for codes I60, I61 and I62 (or respectively ICD-9: 430-432). Where possible, countries are welcomed to share data at subnational level.

## IC6. Hemorrhagic Stroke – All-cause mortality within 365 days after discharge

42. **Purpose:** Deaths within 1-year post-discharge among persons with a first-time hemorrhagic stroke can provide an assessment of the secondary preventive interventions after stroke. These secondary preventative interventions include interventions that have an impact on lifestyle factors such as smoking cessation, dietary counselling, assistance with physical activity, as well as pharmacological therapy, carotid endarterectomy and other.

43. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time hemorrhagic stroke. A first-time hemorrhagic stroke is defined as a hemorrhagic stroke among persons with no hospital admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for any type of stroke from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess mortality.

44. **Numerator:** Number of deaths within 365 days after discharge among those cases meeting the inclusion and exclusion rules for the denominator.

45. **Denominator:** Number of persons discharged alive from hospital for acute non-elective (urgent) care with a *primary diagnosis* of a first-time hemorrhagic stroke from 1 January to 31 December in the specified year [Hemorrhagic stroke diagnostic codes upon separation: ICD-9: 430-432 or ICD-10: I60-I62]. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of stroke [ICD-10: I60-I64 and I69] in previous 5 years are excluded. Day cases are also excluded.

46. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns at ICD-10 level for codes I60, I61 and I62 (or respectively ICD-9: 430-432). Where possible, countries are welcomed to share data at subnational level.



### IC7a. Hemorrhagic Stroke – Mortality or all-cause readmission within 365 days after discharge

47. **Purpose:** Deaths or readmissions within 1-year post-discharge among persons with a first-time hemorrhagic stroke can provide an assessment of the secondary preventive interventions after stroke. These secondary preventative interventions include interventions that have an impact on lifestyle factors such as smoking cessation, dietary counselling, assistance with physical activity, as well as pharmacological therapy, carotid endarterectomy and other.

48. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time hemorrhagic stroke. A first-time hemorrhagic stroke is defined as a hemorrhagic stroke among persons with no hospital admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for any type of stroke from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess mortality and readmissions.

49. **Numerator:** The number of patients in the denominator who died within 365 days after discharge from the index episode of care or who were readmitted to hospital for acute non-elective (urgent) care of any condition at least once within 365 days after discharge from the index episode of care. If a patient was readmitted and died in the specified period, this patient should be counted only once.

50. **Denominator:** Number of persons discharged alive from hospital for acute non-elective (urgent) care with a *primary diagnosis* of a first-time hemorrhagic stroke from 1 January to 31 December in the specified year [Hemorrhagic stroke diagnostic codes upon separation: ICD-9: 430-432 or ICD-10: I60-I62]. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of stroke [ICD-10: I60-I64 and I69] in previous 5 years are excluded. Day cases are also excluded.

51. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns at ICD-10 level for codes I60, I61 and I62 (or respectively ICD-9: 430-432). Where possible, countries are welcomed to share data at subnational level.

### IC7b. Hemorrhagic Stroke – Mortality or disease-specific readmission within 365 days after discharge

52. **Purpose:** Deaths or readmissions within 1-year post-discharge among persons with a first-time hemorrhagic stroke can provide an assessment of the secondary preventive interventions after stroke. These secondary preventative interventions include interventions that have an impact on lifestyle factors such as smoking cessation, dietary counselling, assistance with physical activity, as well as pharmacological therapy, carotid endarterectomy and other.

53. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time hemorrhagic stroke. A first-time hemorrhagic stroke is defined as a hemorrhagic stroke among persons with no hospital admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for any type of stroke from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess mortality and readmissions.

54. **Numerator:** The number of patients in the denominator who died within 365 days after discharge from the index episode of care or who were readmitted to hospital for acute non-elective (urgent) in-patient care at least once within 365 days with stroke or late effects (sequelae) of stroke as the primary diagnosis. [ICD-10: I60-I64 and I69]. If a patient was readmitted and died in the specified period, this patient should be counted only once.

55. **Denominator:** Number of persons discharged alive from hospital for acute non-elective (urgent) care with a *primary diagnosis* of a first-time hemorrhagic stroke from 1 January to 31 December in the specified year [Hemorrhagic stroke diagnostic codes upon separation: ICD-9: 430-432 or ICD-10: I60-I62]. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of stroke [ICD-10: I60-I64 and I69] in previous 5 years are excluded. Day cases are also excluded.

56. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns at ICD-10 level for codes I60, I61 and I62 (or respectively ICD-9 430-432). Where possible, countries are welcomed to share data at subnational level.

## IC8. Hemorrhagic Stroke - Prescribed antihypertensive medicines between 12 and 18 months after hemorrhagic stroke

57. **Purpose:** High blood pressure is the single most important risk factor for stroke - both ischemic stroke and cerebral haemorrhage. The risk of a new stroke or of other cardiovascular diseases is also increased for people with high blood pressure. Therefore, treatment with antihypertensive medicines is one of the most important therapies after stroke. As the indicator measures pharmacological therapy between 12 and 18 months after the acute care for stroke, it is a measure of the secondary prevention outside the hospital.

58. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived 18-months after a first-time, acute, non-elective (urgent) episode of care for hemorrhagic stroke. A first-time hemorrhagic stroke is defined as a hemorrhagic stroke among persons with no hospital admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for stroke from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess prescriptions.

59. **Numerator:** The number of stroke cases in the denominator with at least one prescribed antihypertensive medicine from the list below within the 182 day (i.e. 6-month) time window between 12 months and 18 months after the hospital discharge date of the first-time episode of care for hemorrhagic stroke. To clarify: For patients discharged alive in the year 2018, prescription data for both 2019 and the first 6 months of 2020 is needed to follow all discharged cases in a time interval of day 365 to day 547 after discharge.

60. Antihypertensive medicines, ATC codes:

- Alpha-blocker and Methyldopa, C02
- Diuretics, C03
- Beta blockers C07
- Calcium channel blockers, C08
- Renin-angiotensin-aldosterone system (RAAS) inhibitors (N.B. includes Angiotensin Converting Enzyme inhibitors, ACE inhibitors; Angiotensin Receptor Blockers, ARB), C09

61. **Denominator:** Number of persons discharged alive from hospital for acute non-elective (urgent) care with a *primary diagnosis* of a first-time hemorrhagic stroke from 1 January to 31 December in the specified year discharged from hospital and surviving 18 months after discharge [Hemorrhagic stroke diagnostic codes upon separation: ICD-9: 430-432 or ICD-10: I60-I62]. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of stroke [ICD-10: I60-I64 and I69] in the previous 5 years are excluded.

62. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns at ICD-10 level for codes I60, I61 and I62 (or respectively ICD-9 430-432). Where possible, countries are welcomed to share data at subnational level.

### IC9a. CHF – All-cause hospital readmissions within 365 days after discharge

63. **Purpose:** The indicator aims to reflect the quality in the care of patients with heart failure both in primary care and in specialised outpatient care. The causes of hospital readmissions may include, for example, premature discharge, inadequate pharmacological therapy, poor information to patients about the disease and a lack of follow-up in the following care.

64. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time episode of care for heart failure. A first-time episode of care for heart failure is defined as persons with no hospital admission for heart failure [ICD-10: I11.0, I13.0, I13.2, and I50] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for heart failure from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess readmissions.

65. **Numerator:** The number of patients in the denominator who were readmitted to hospital for acute non-elective (urgent) care of any condition at least once within 365 days after discharge from the index episode of care. Elective admissions are excluded.

66. **Denominator:** Number of persons discharged alive from hospital after first acute non-elective (urgent) episode of care with a *primary diagnosis* of heart failure from 1 January to 31 December in the specified year. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for heart failure [ICD-10: I11.0, I13.0, I13.2, and I50] in previous 5 years are excluded. Day cases are also excluded.

67. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns. Where possible, countries are welcomed to share data at subnational level.

### IC9b. CHF - Disease-specific hospital readmissions within 365 days after discharge

68. **Purpose:** The indicator aims to reflect the quality in the care of patients with heart failure both in primary health care and in specialised outpatient care. Contributing factors for deaths may include, for example, premature discharge, inadequate medicine therapy, poor information to patients about the disease and a lack of follow-up in the following care.

69. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time episode of care for heart failure. A first-time episode of care for heart failure is defined as persons with no hospital admission for heart failure [ICD-10: I11.0, I13.0, I13.2, and I50] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for heart failure from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess readmission.

70. **Numerator:** Number of persons in the denominator who were readmitted to in-patient care at least once with a primary diagnosis for heart failure within 365 days after discharge. [ICD-10: I11.0, I13.0, I13.2, I42.0-I42.9, I50].

71. **Denominator:** Number of persons discharged alive from hospital after first acute non-elective (urgent) episode of care with a *primary diagnosis* of heart failure from 1 January to 31 December in the specified year. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-

elective (urgent) care admission for heart failure [ICD-10: I11.0, I13.0, I13.2, and I50] in previous 5 years are excluded. Day cases are also excluded.

72. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns. Where possible, countries are welcomed to share data at subnational level.

### IC10. CHF - All-cause mortality within 365 days after discharge

73. **Purpose:** The indicator aims to reflect the quality in the care of patients with heart failure both in primary health care and in specialised outpatient care. Contributing factors for deaths may include, for example, premature discharge, inadequate pharmacological therapy, poor information to patients about the disease and a lack of follow-up in the following care.

74. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time episode of care for heart failure. A first-time episode of care for heart failure is defined as persons with no hospital admission for heart failure [ICD-10: I11.0, I13.0, I13.2, and I50] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for heart failure from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess mortality.

75. **Numerator:** Number of deaths within 365 days after discharge among those cases meeting the inclusion and exclusion rules for the denominator. Elective admissions are excluded.

76. **Denominator:** Number of persons discharged alive from hospital after first acute non-elective (urgent) episode of care with a *primary diagnosis* of heart failure from 1 January to 31 December in the specified year. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for heart failure [ICD-10: I11.0, I13.0, I13.2, and I50] in previous 5 years are excluded.

77. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns. Where possible, countries are welcomed to share data at subnational level.

### IC11a. CHF – Mortality or all-cause readmission within 365 days after discharge

78. **Purpose:** The indicator aims to reflect the quality in the care of patients with heart failure both in primary health care and in specialised outpatient care. Contributing factors for deaths may include, for example, premature discharge, inadequate pharmacological therapy, poor information to patients about the disease and a lack of follow-up in the following care.

79. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time episode of care for heart failure. A first-time episode of care for heart failure is defined as persons with no hospital admission for heart failure [ICD-10: I11.0, I13.0, I13.2, and I50] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for heart failure from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess mortality and readmissions.

80. **Numerator:** The number of patients in the denominator who died within 365 days after discharge from the index episode of care or who were readmitted to hospital for acute non-elective (urgent) care of any condition at least once within 365 days after discharge from the index episode of care. If a patient was readmitted and died in the specified period, this patient should be counted only once.

81. **Denominator:** Number of persons discharged alive from hospital after first acute non-elective (urgent) episode of care with a *primary diagnosis* of heart failure from 1 January to 31 December in the specified year. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for heart failure [ICD-10: I11.0, I13.0, I13.2, and I50] in previous 5 years are excluded.

82. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns. Where possible, countries are welcomed to share data at subnational level.

### IC11b. CHF – Mortality or disease-specific readmission within 365 days after discharge

83. **Purpose:** The indicator aims to reflect the quality in the care of patients with heart failure both in primary health care and in specialised outpatient care. Contributing factors for deaths may include, for example, premature discharge, inadequate pharmacological therapy, poor information to patients about the disease and a lack of follow-up in the following care.

84. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived acute non-elective (urgent) episode of care for a first-time episode of care for heart failure. A first-time episode of care for heart failure is defined as persons with no hospital admission for heart failure [ICD-10: I11.0, I13.0, I13.2, and I50] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for heart failure from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess mortality and readmissions.

85. **Numerator:** The number of patients in the denominator who died within 365 days after discharge from the index episode of care or who were readmitted to in-patient care at least once with a primary diagnosis for heart failure within 365 days after discharge. [ICD-10: I11.0, I13.0, I13.2, I50]. If a patient was readmitted and died in the specified period, this patient should be counted only once.

86. **Denominator:** Number of persons discharged alive from hospital after first acute non-elective (urgent) episode of care with a *primary diagnosis* of heart failure from 1 January to 31 December in the specified year. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for heart failure [ICD-10: I11.0, I13.0, I13.2 and I50] in previous 5 years are excluded.

87. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns. Where possible, countries are welcomed to share data at subnational level.

### IC12. CHF - Prescribed medicines between 12 and 18 months after heart failure

88. **Purpose:** The indicator follows up on the continued prescription of medicines in a sub-population of persons with heart failure i.e. those with heart failure with reduced ejection fraction (HFrEF) - also referred to as systolic heart failure. Persons with HFrEF should first and foremost receive basic pharmacological treatment. The basic treatment generally consists of triple therapy with a Renin-angiotensin-aldosterone system (RAAS) inhibitor (includes Angiotensin Converting Enzyme inhibitors, ACE-I; Angiotensin Receptor Blockers, ARB; Angiotensin Receptor Neprilysin Inhibitors, ARNI), plus a Beta-blocker and a Mineralocorticoid Receptor Agonist (MRA). Although Sodium/glucose cotransporter-2 inhibitors (SGLT2i) have also recently been approved in the heart failure indication, place in therapy is yet to be determined in many OECD countries. In a small number of cases, patients might receive dual therapy or monotherapy due to reasons such as side effects and contraindications. In many cases, the treatments have a positive effect on patients with heart failure of varying severity, and reduce the risk of hospitalisation, myocardial infarction and early death.

89. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who survived 18-months after a first-time, acute, non-elective (urgent) episode of care for HFrEF. A first-time episode of care for HFrEF is defined as HFrEF among persons with no hospital admission for any type of heart failure [ICD-10: I11.0, I13.0, I13.2, and I50] in the previous 5 years (i.e. considering a washout period of 5 years or 1825 days). Example: a wash out period of 5 years means, for instance, an incident on 7 July 2018, and no admission for heart failure from 7 July 2013 to 6 July 2018; data for 2019 is needed to assess prescriptions.

90. **Numerator:** Three numerators will be collected separately to assess this indicator. Patients may be counted only once in each numerator, but may appear in more than one of the numerators.

1. The number of cases in the denominator with at least one prescription of triple therapy (i.e. at least one prescription of one medicine from three of the following ATC classes as described below) within the 182 day (i.e. 6-month) time window between 12 months and 18 months after the hospital discharge date of the first-time episode of care for heart failure. Triple therapy includes a RAAS inhibitor AND a Beta-blocker, AND either a MRA OR SGLT2i.

- RAAS inhibitors: C09 (excluding C09X) (N.B. includes ACE-I, ARB, or ARNI)

AND

- Beta-blockers: C07

AND

- EITHER Mineralocorticoid Receptor Antagonists (MRA): C03DA OR Sodium/glucose cotransporter-2 inhibitors (SGLT2i): A10BK01 (dapagliflozin) and A10BK03 (empagliflozin)

N.B. Some patients may receive a single-pill combination of dual therapy of RAAS-inhibitor plus Beta-blocker, in which case patients can also be included in this numerator if they have at least one prescription of an MRA or SGLT2i plus one medicine with the following ATC codes: C09BX02 (perindopril and bisoprolol), C09BX04 (perindopril, bisoprolol and amlodipine), C09BX05 (ramipril and bisoprolol), C09DX05 (valsartan and nebivolol)

2. The number of cases in the denominator with at least one prescription of dual therapy (i.e. at least one prescription of one medicine from two of the following ATC classes) within the 182 day (i.e. 6-month) time window between 12 months and 18 months after the hospital discharge date of the first-time episode of care for heart failure:

- RAAS inhibitors: C09 (excluding C09X) (N.B. includes ACE-I, ARB, ARNI)
- Beta-blockers: C07
- Mineralocorticoid Receptor Antagonists (MRA): C03DA
- Sodium/glucose cotransporter-2 inhibitors (SGLT2i): A10BK01 (dapagliflozin) and A10BK03 (empagliflozin)

N.B. Some patients may receive a single-pill combination of dual therapy, in which case patients can also be included in this numerator if they have at least one prescription of one medicine with the following ATC codes: C09BX02 (perindopril and bisoprolol), C09BX04 (perindopril, bisoprolol and amlodipine), C09BX05 (ramipril and bisoprolol), C09DX05 (valsartan and nebivolol)

3. The number of cases in the denominator with at least one prescription of monotherapy (i.e. at least one prescription of one medicine from one of the below ATC medicine classes) within the 182 day (i.e. 6-month) time window between 12 months and 18 months after the hospital discharge date of the first-time episode of care for heart failure:

- RAAS inhibitors: C09 (excluding C09X) (N.B. includes ACE-I, ARB, ARNI)
- Beta-blockers: C07
- Mineralocorticoid Receptor Antagonists (MRA): C03DA

- Sodium/glucose cotransporter-2 inhibitors (SGLT2i): A10BK01 (dapagliflozin) and A10BK03 (empagliflozin)

*To clarify for all three numerators: For patients discharged alive in the year 2018, prescription data for both 2019 and the first 6 months of 2020 is needed to follow all discharged cases in a time interval of day 365 to day 547 after discharge.*

91. **Denominator:** Number of persons discharged alive from hospital for acute non-elective (urgent) care with a *primary diagnosis* of a first-time HFrEF [ICD-10: I50.2] from 1 January to 31 December in the specified year and surviving 18 months after discharge. The denominator is restricted to persons aged 15 years or older at the day of admission. Patients who had an acute non-elective (urgent) care admission for any type of heart failure [ICD-10: I11.0, I13.0, I13.2, and I50] in the previous 5 years are excluded.

92. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns. Where possible, countries are welcomed to share data at subnational level.

### IC13. CHF – Case fatality within 30 days of the admission date

93. **Purpose:** This indicator refers to the percentage of people aged 15 and older who die within 30 days following admission to hospital for a specific acute condition of congestive heart failure. It considers deaths that occurred anywhere including in or outside of hospital.

94. **Coverage:** This indicator is measured in a population of patients aged 15 years and older who are admitted for an acute non-elective (urgent) episode of care for heart failure.

95. **Numerator:** The number of patients in the denominator who died (either in hospital or out of hospital) within 30 days of the last hospital admission date.

96. **Denominator:** Number of persons with a latest *admission* to hospital for acute non-elective (urgent) care with a *primary diagnosis* of heart failure from 1 January to 31 December in the specified year [ICD-10: I11.0, I13.0, I13.2, and I50]. Please note only one admission per patient is to be counted in the denominator and the numerator is calculated by following up all denominator cases for up to 30 days from date of admission.

97. **Data to be delivered:** Data will be collected for national level data for both the numerator and the denominator for 10-year age and breakdowns. Where possible, countries are welcomed to share data at subnational level.

## 2 Sources and Methodology Questions

1. Are you using a unique patient identifier to link databases to calculate these indicators?
2. What databases are you using to calculate these indicators?
3. Are your databases nationally representative of the patient cohorts being analysed? (if not, do you want them to describe the data coverage and representativeness?)
4. How do you define acute hospital care and identify urgent (i.e. non-elective) hospital readmissions?
5. How do you define hospital discharge from a given episode of care and define an index hospitalisation?
6. Are you able to identify origin and destination of admission e.g. can you distinguish whether the patient was admitted to/from a long-term care facility?
7. Please describe the data range for the data being submitted?
8. Were the required inclusion/exclusion criteria applied to this dataset? If not, please specify.
9. Were the required indicators presented per ICD code? If not, please specify.
10. Can you provide details about the historical data, washout and follow up periods used (e.g. compliance and deviation from definitions provided and additional specifications used)?
11. Please describe the data used to calculate indicators IC4, IC8, and IC12 (registry of prescribed drugs or drug reimbursement claims data)



# 3 Interview guide for interviews with country experts

- Can you please provide information about the existing set of indicators used in your country to measure performance of integrated care delivery systems or co-ordination of care across the patient pathway?
- Could you describe the strengths and weaknesses of your health data infrastructure for performance monitoring of integrated care, in what regards governance, data quality and linkage at patient level? Please only provide any additional information that is not reflected in your answers to the OECD HCQO Survey of Health Data and Governance 2019.
- Could you please list the national policies adopted in your country in the recent past targeting performance monitoring of integrated and co-ordination of care, including new governance models of health care and service delivery and payment mechanisms?
- How is your country approaching the transition from hospital governance to system-oriented governance of health care delivery?
- What is your country's national strategy for data infrastructure related to performance measurement of integrated care?