

SUPPLEMENTARY MATERIAL

METHODS

Data source and programme implementation

The National Health Service (NHS) primary care data was extracted from electronic health records via the North England commissioning support unit. As part of the programme, data from NHS Digital is also being collected for all primary care networks (PCNs). The programme was implemented on behalf of the NHS Hull Clinical Commissioning Group (CCG) and was approved by Hull University Teaching Hospitals Clinical Governance and Hull York Medical School Research Ethics Committees.

Pilot site analysis

In the pilot PCN, data related to patient characteristics, diagnoses, asthma reviews and prescriptions were collected at three time periods: 24–12 months and 12-months pre-implementation and 12 months post-implementation, which enabled a comparison of prescribing patterns in the context of the United Kingdom government lockdowns and restrictions [1].

Patient population

Asthma diagnosis in the primary care record was defined by the Quality and Outcomes Framework code list for asthma diagnosis. Patients who opted out of sharing their healthcare data and those with a validated diagnosis of chronic obstructive pulmonary disease in their primary care record were excluded.

Variables and analysis outcomes

Analysis of exacerbations 24–12 and 12 months pre-implementation and 12 months post-implementation enabled a comparison of exacerbation incidence relative to changes in prescribing patterns during the same period.

Reference

1. Institute for Government. Timeline of UK Government Coronavirus Lockdowns and Restrictions. www.instituteforgovernment.org.uk/charts/uk-government-coronavirus-lockdowns/. Date last accessed: 16 June 2022. Date last updated: December 2021.

SUPPLEMENTARY TABLE S1 Mean±SD number of asthma medication prescriptions per year received at 24–12 and 12 months pre- and 12 months post-implementation in (a) the overall asthma population (N=2571), (b) patients who underwent asthma review (n=864) and (c) patients who transitioned to MART (n=386)

Asthma medication	24–12 months pre-implementation (November 2018 to October 2019)	12 months pre-implementation (November 2019 to October 2020)	12 months post-implementation (February 2021 to January 2022)
(a) All registered patients with asthma (N=2571)			
SABA			
Mean±SD	3.9±4.5	4.1±4.8	2.0±3.5
Median (IQR); range	2 (7); 28	2 (7); 24	0 (2); 22
ICS			
Mean±SD	4.6±4.9	4.6±5.2	4.8±5.3
Median (IQR); range	3 (8); 26	2 (8); 28	3 (9); 30
MART			
Mean±SD	0.14±1.10	0.26±1.48	1.90±3.97
Median (IQR); range	0 (0); 17	0 (0); 16	0 (1); 18
(b) Patients who underwent asthma review (n=864)			
SABA			
Mean±SD	6.87±4.87	8.14±4.74	2.41±4.12
Median (IQR); range	7 (9); 21	8 (7); 21	0 (3); 20
ICS			
Mean±SD	6.9±5.1	7.5±5.4	8.0±5.4
Median (IQR); range	7 (9); 25	8 (10); 26	8 (8.75); 30
MART			
Mean±SD	0.17±1.27	0.39±1.91	4.54±5.30
Median (IQR); range	0 (0); 14	0 (0); 16	2 (9); 18
(c) Patients who transitioned to MART (n=386)			
SABA			
Mean±SD	7.36±4.93	8.93±4.65	1.49±3.44
Median (IQR); range	8 (9); 17	9.5 (7); 20	0 (1); 15
ICS			
Mean±SD	7.0±5.0	7.5±5.4	9.1±5.0
Median (IQR); range	7 (9); 25	8 (9); 26	9 (8); 30
MART			
Mean±SD	0±0	0±0	7.88±4.81
Median (IQR); range	0	0	8 (8); 18

Data are also presented as median (IQR); range.

ICS: inhaled corticosteroid; IQR: interquartile range; MART: maintenance and reliever therapy; SABA: short-acting β_2 -agonist; SD: standard deviation.

SUPPLEMENTARY TABLE S2 Mean±SD number of asthma medication prescriptions per year (3-month period summary) received at 3-, 6-, 9- and 12-months post-implementation by patients who transitioned to MART (n=386) and maintained their MART

Asthma medication	3 months post-implementation (February 2021 to April 2021)	6 months post-implementation (May 2021 to July 2021)	9 months post-implementation (August 2021 to October 2021)	12 months post-implementation (November 2021 to January 2022)
Patients, n (%)	327 (84.7)	313 (81.1)	308 (79.8)	276 (71.5)
SABA				
Mean±SD	0.25±0.79	0.25±0.77	0.26±0.77	0.29±0.90
Median (IQR); range	0 (0); 5	0 (0); 4	0 (0); 4	0 (0); 5
ICS				
Mean±SD	2.60±1.23	2.60±1.17	2.49±1.25	2.71±1.38
Median (IQR); range	3 (1); 9	3 (1); 6	2 (1); 7	3 (2); 7
MART				
Mean±SD	2.49±1.08	2.50±1.06	2.36±1.06	2.60±1.18
Median (IQR); range	3 (1); 5	3 (1); 5	2 (2); 4	3 (1); 6

Data are also presented as median (IQR); range.

ICS: inhaled corticosteroid; IQR: interquartile range; MART: maintenance and reliever therapy; SABA: short-acting β_2 -agonist; SD: standard deviation.

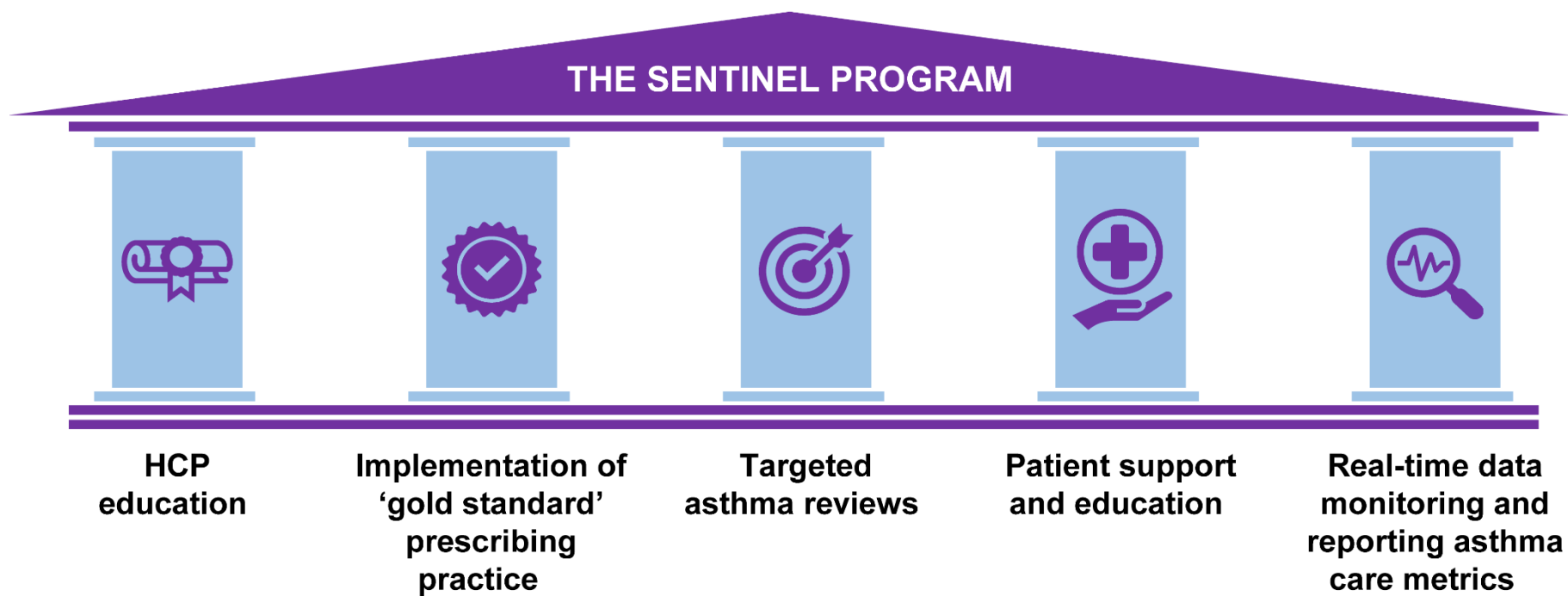
SUPPLEMENTARY TABLE S3 Mean±SD number of asthma exacerbations per patient at 24–12 and 12 months pre- and 12 months post-implementation in (a) the overall asthma population (N=2571), (b) patients who underwent asthma review (n=864) and (c) patients who transitioned to MART (n=386)

Asthma exacerbations	24–12 months pre-implementation (November 2018 to October 2019)	12 months pre-implementation (November 2019 to October 2020)	12 months post-implementation (February 2021 to January 2022)
(a) All registered patients with asthma (N=2571)			
Mean±SD	0.33±1.17	0.28±0.97	0.22±0.69
Median (IQR); range	0 (0); 32	0 (0); 23	0 (0); 11
(b) Patients who underwent asthma review (n=864)			
Mean±SD	0.49±1.10	0.48±0.97	0.32±0.82
Median (IQR); range	0 (1); 9	0 (1); 8	0 (0); 7
(c) Patients who transitioned to MART (n=386)			
Mean±SD	0.45±1.07	0.44±0.93	0.35±0.99
Median (IQR); range	0 (0); 8	0 (1); 6	0 (0); 11

Data are also presented as median (IQR); range.

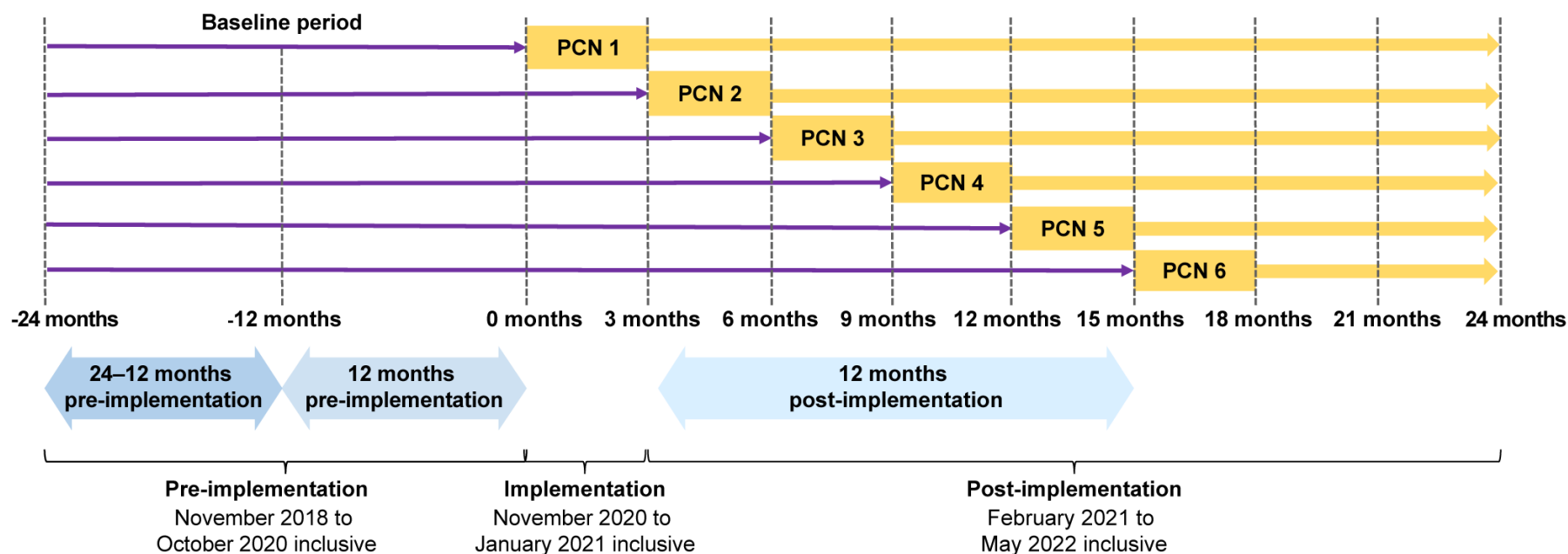
IQR: interquartile range; MART: maintenance and reliever therapy; SD: standard deviation.

SUPPLEMENTARY FIGURE S1 The 5 key pillars of the SENTINEL programme



HCP: healthcare practitioner; SABA: short-acting β 2-agonist; SENTINEL: SABA rEducationN Through ImplemeNting Hull asthma guidELines.

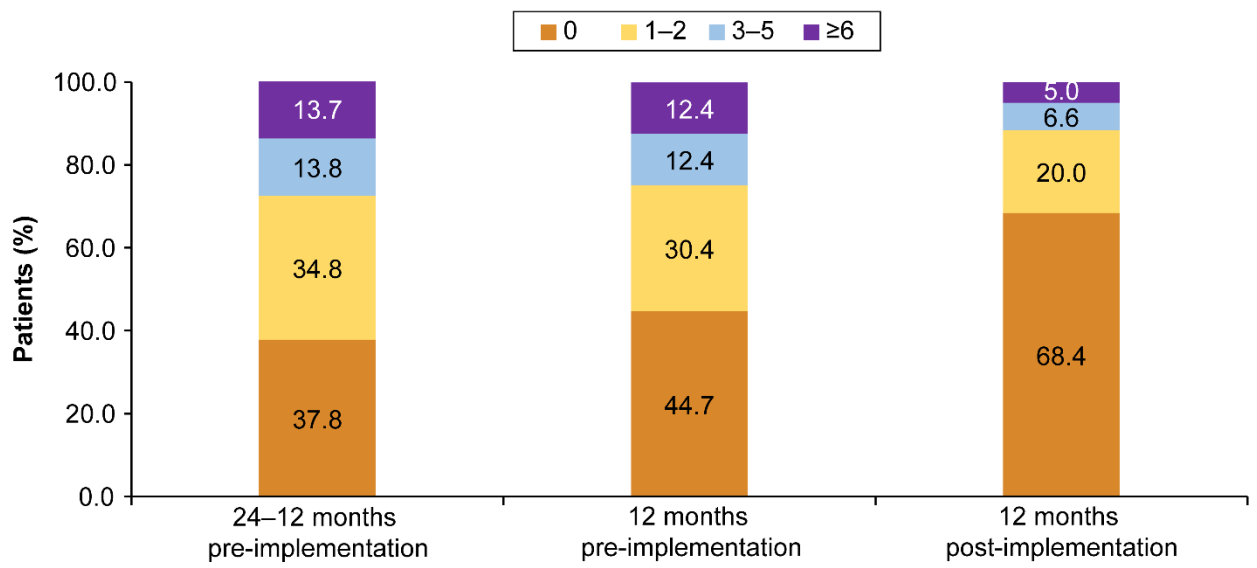
SUPPLEMENTARY FIGURE S2 The SENTINEL programme design



- **Data source:** Routinely collected NHS primary care data extracted from EHRs
- **Time periods for data collection in the pilot PCN:**
 - 24–12 months pre-implementation (November 2018 to October 2019)
 - 12 months pre-implementation (November 2019 to October 2020)
 - 12 months post-implementation (February 2021 to January 2022)
- **Outcomes:**
 - **Prescribing patterns for asthma medications** (SABA, ICS-containing medications [including monotherapy and fixed-dose combinations], MART, and SABA:ICS ratio)
 - **Asthma exacerbations** (defined as short-burst OCS prescriptions; 30–40 mg prednisolone daily for 3–14 days)

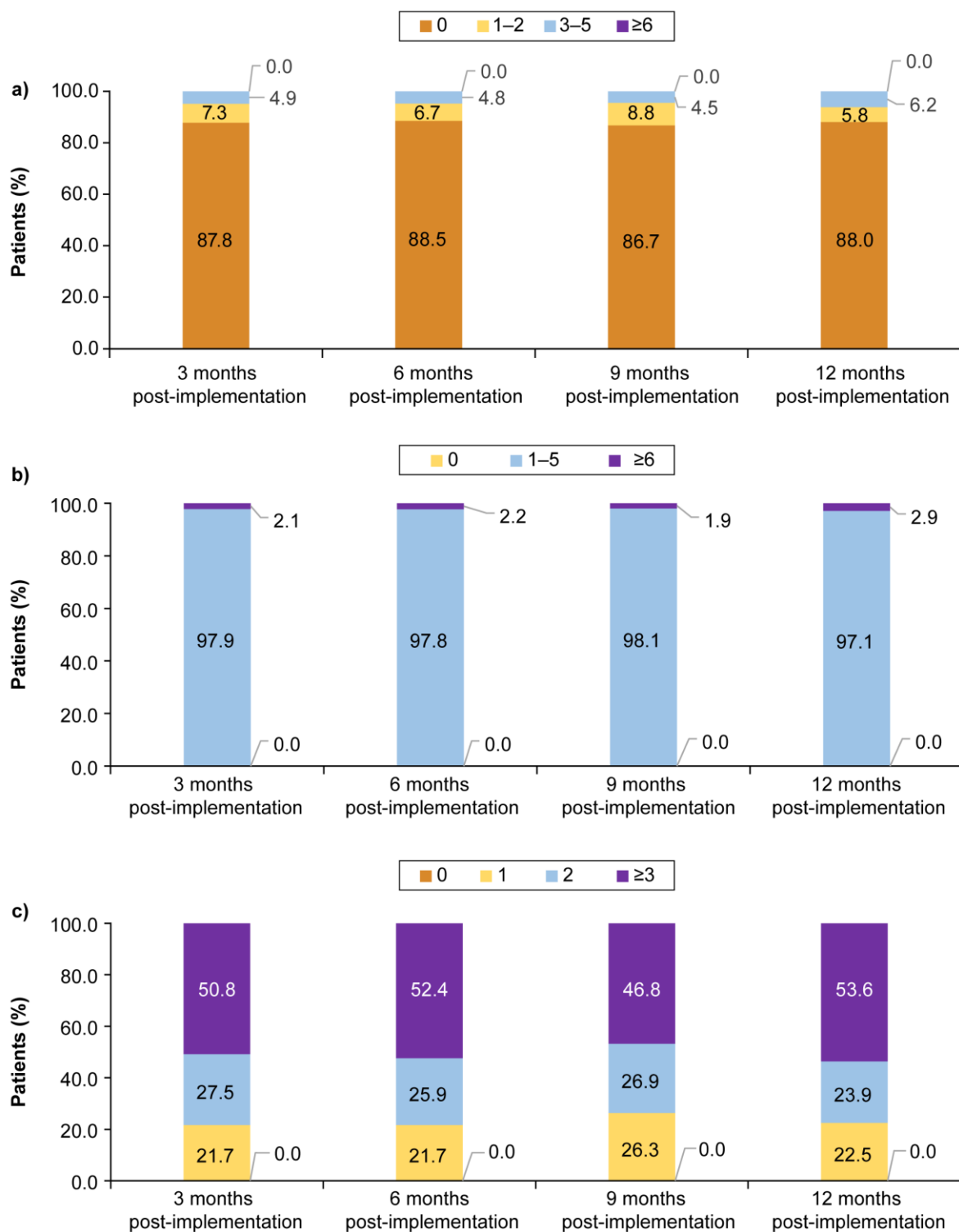
EHR: electronic health record; ICS: inhaled corticosteroid; MART: maintenance and reliever therapy; NHS: National Health Service; OCS: oral corticosteroid; PCN: primary care network; SABA: short-acting β_2 -agonist; SENTINEL: SABA rEductionN Through ImpleMeNting Hull asthma guidELines.

SUPPLEMENTARY FIGURE S3 Proportion of patients receiving zero, one or two, three to five, and six or more SABA canister prescriptions among those who received no prescriptions for ICS-containing medications during 12-months post-implementation in the SENTINEL program (n=996)



Percentages may not sum to 100% due to rounding. ICS: inhaled corticosteroid; SABA: short-acting β_2 -agonist; SENTINEL: SABA rEductionN Through ImplemeNting Hull asthma guidELines.

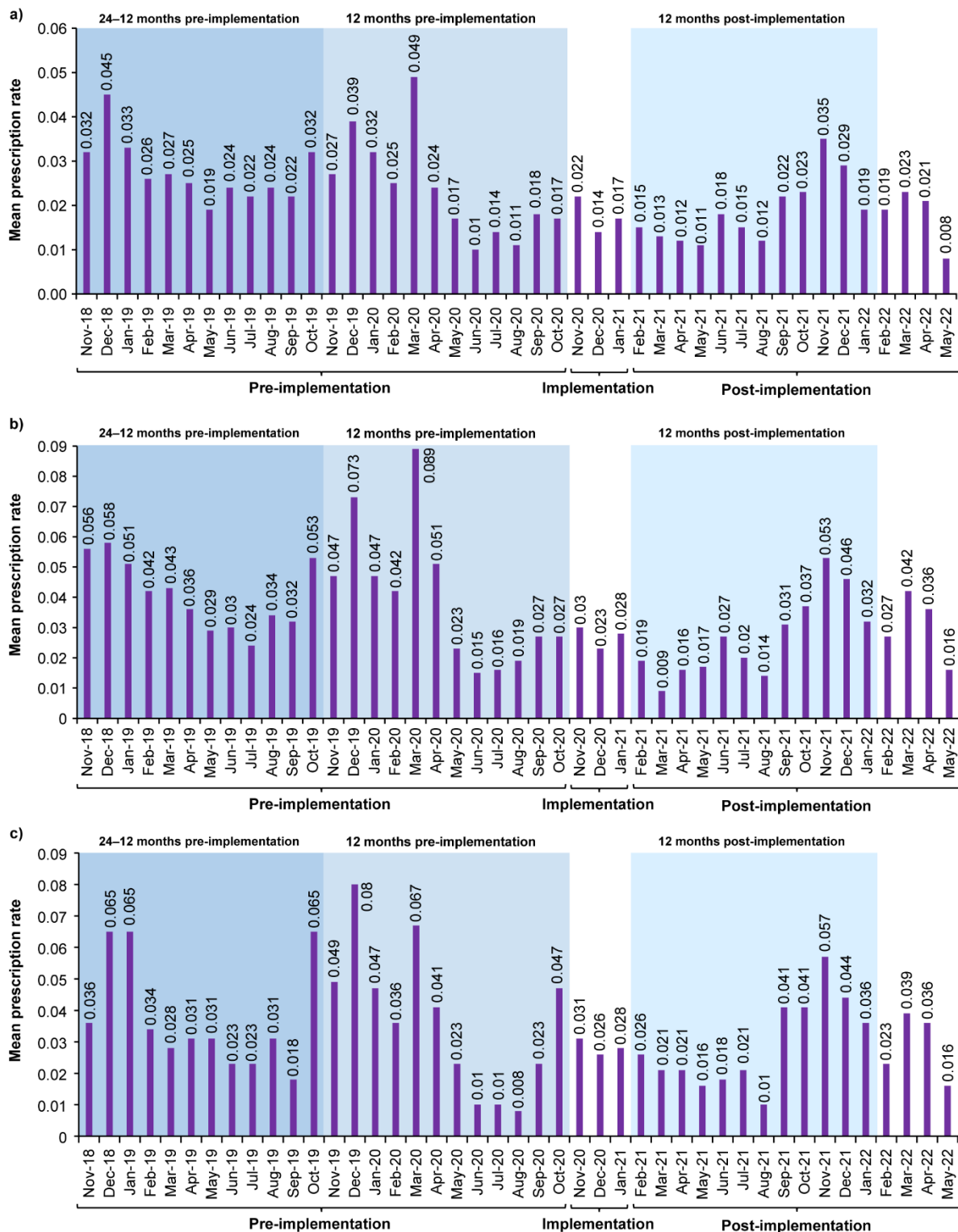
SUPPLEMENTARY FIGURE S4 Proportion of patients receiving asthma medication prescriptions per year (3-month period summary) for (a) SABA, (b) ICS-containing medications and (c) MART at 3-, 6-, 9- and 12-months post-implementation among those who transitioned to MART and maintained their MART during the SENTINEL programme



Percentages may not sum to 100% due to rounding.

ICS: inhaled corticosteroid; MART: maintenance and reliever therapy; SABA: short-acting β_2 -agonist; SENTINEL: SABA rEductionN Through ImplemeNting Hull asthma guidELines.

Supplementary Figure S5 Monthly mean prescriptions per patient for short-burst OCS among (a) overall asthma population (N=2571), (b) patients who underwent asthma review (n=864) and (c) patients who switched to MART therapy (n=386) during the SENTINEL programme



OCS: oral corticosteroid; MART: maintenance and reliever therapy; SABA: short-acting β_2 -agonist; SENTINEL: SABA rEduction Through ImplemeNting Hull asthma guidELines.