Assessment and management of asthma and chronic obstructive pulmonary disease in Australian general practice

Helen K Reddel, Lisa Valenti, Kylie L Easton, Julie Gordon, Clare Bayram, Graeme C Miller

Background

Dispensing data suggest potential issues with the quality use of medicines for airways disease.

Objective

The objective of this article was to describe the management of asthma and chronic obstructive pulmonary disease (COPD) in general practice, and investigate the appropriateness of prescribing.

Method

The method used for this study consisted of a national cross-sectional survey of 91 Australian general practitioners (GPs) participating in the Bettering the Evaluation and Care of Health (BEACH) program.

Results

Data were available for 2589 patients (288 asthma; 135 COPD). For the patients with asthma, GPs classified asthma as well controlled in 76.4%; 54.3% were prescribed inhaled corticosteroids (ICS), mostly (84.9%) as combination therapy, and mostly at moderate–high dose; only 26.3% had a written action plan. GPs classified COPD as mild for 42.9%. Most patients with COPD (60.9%) were prescribed combination ICS therapy and 36.7% were prescribed triple therapy.

Discussion

There were substantial differences between guideline-based and GP-recorded assessment and prescription for asthma and COPD. Further research is needed to improve care and optimise patient outcomes with scarce health resources.

Respiratory conditions, including asthma, chronic obstructive pulmonary disease (COPD) and respiratory infections are among the most common problems managed in Australian general practice, at 17.8% of general practitioner (GP)–patient encounters.[1] Asthma is largely managed in general practice; for example, in 2011–12, 57.1% of patients with asthma saw a GP about their condition in the previous 12 months, whereas only 6.0% saw a specialist.[2]

Australia has up-to-date, evidence-based guidelines for asthma (*Australian asthma handbook*)[3] and COPD (*COPD-X*).[4] However, the clinical features of asthma, COPD and other respiratory conditions may be similar, presenting diagnostic difficulties.[5,6] In addition, indications for respiratory medications and their order of introduction differ substantially between asthma and COPD. For asthma, guidelines recommend that treatment should be based on asthma control, progressing from as-needed, short-acting β_2-agonist (SABA) through to low-dose inhaled corticosteroids (ICS), low-dose ICS/long-acting β_2-agonist (LABA), and moderate–high dose ICS/LABA. For safety, LABA should never be used without ICS.[3] For COPD, guidelines recommend that treatment should be based on severity, assessed from spirometry, symptoms and exacerbations. Treatment for COPD progresses from as-needed SABA to LABA and/or long-acting muscarinic antagonist (LAMA) to ICS/LABA (with/without LAMA) for patients with severe COPD and recurrent exacerbations. In COPD, ICS should not be used without a LABA and/or LAMA.[4]

Given this therapeutic complexity, the aim of this study was to describe the management of patients with asthma, COPD and/or respiratory symptoms in general practice, and compare the management with guideline recommendations. We focused on quality-of-care markers, including appropriateness of assessment, lung function measurement, prescribing and ownership of written action plans.

Methods

Collection methods and sample

Data were collected in a Supplementary Analysis of Nominated Data (SAND) sub-study of the Bettering the Evaluation And Care of Health (BEACH) program, a continuous, national, cross-sectional survey of Australian general practice activity using a random sample of GPs. Methods for the BEACH study are described in detail elsewhere.[7] In this sub-study (October–December 2012), GPs were asked about patients with asthma, COPD, post-viral cough and/or other respiratory symptoms, regardless of whether that condition was managed at the encounter. Data were collected about the visit purpose, respiratory medications, measurement of lung function in the past two years, ownership of a written asthma or COPD action plan, and asthma control and COPD severity (Appendix 1; available online only). Assessment of asthma control and COPD severity was based on guidelines that were current at the time,[8,9] which, for these questions, differed only minimally from current guidelines at the time of publication[3,4] (Appendix 2; available online only). For analysis, medication groups were based on guideline recommendations and classifications that were current then[8–10] and at the time of publication.[3,4,11]

Ethics approval for BEACH and this sub-study was provided by the University of Sydney's Human Research Ethics Committee (HREC: 2012/130).

Statistical analysis

A cluster sample design was used in this study; the GP was the primary sampling unit, and the patient was the unit of analysis. Survey procedures were used to account for the cluster study design. Data were reported by descriptive statistics. A statistically significant difference between results was determined by non-overlapping 95% confidence intervals (CI). SAS version 9.3 (SAS Institute Inc, Cary, NC) was used for all analyses.

Results

Responses

During the study period, 91 GPs completed 2710 encounter forms with a response about respiratory conditions for 2589 patients (95.5%). Age and gender distributions of the patients (Table 1) did not differ from those in the total sample of BEACH encounters.[7]

Respiratory conditions and their management

One or more of the listed respiratory conditions were reported for 498 patients (n = 2589; 19.2%; 95% CI: 17.1, 21.4): asthma for 288 patients (n = 2589; 11.1%), COPD for 135 patients (n = 2589; 5.2%); of these, 6.3% (25/398) had asthma and COPD (Table 1). Post-viral cough and 'other respiratory symptoms' were reported for 22 (n = 2589; 0.8%) and 99 (n = 2589; 3.8%) patients respectively, but were not further investigated because SAND questions were not completed for 182 patients (n = 403; 45.2%) with a

Table 1. Patient characteristics and respiratory management at general practice encounters

	All patients n (%)	Asthma, n (%) [95% CI]	COPD n (%) [95% CI]	Asthma and COPD n (%) [95% CI]
Patients	2589 (100.0%)	288 (11.1%) [9.5, 12.8]	135 (5.2%) [4.0, 6.4]	25 (1.0%) [0.5, 1.4]
Gender (female)	1495 (58.2%)	170 (59.6%)	50 (37.3%)	11 (44.0%)
Age distribution				
0–14	286 (11.0%)	37 (12.8%)	0	0
15–64	1687 (65.2%)	178 (61.8%)	37 (2.7%)	9 (36.0%)
≥65	800 (30.9%)	69 (24.0%)	97 (71.9%)	165 (64.0%)
Visit details		n	n	n
Specified respiratory condition managed at today's encounter,* n (%) [95% CI]		74 (25.7%) [20.6, 30.8]	32 (23.7%) [15.7, 31.7]	11 (44.0%) [17.3, 70.7]
Type of management at today's visit†				
Diagnosis		6	2	0
Exacerbation		23	9	4
Review		12	11	5
Repeat script		30	6	3
Other		11	4	0

The specified respiratory conditions included in this survey were 'asthma', 'COPD', 'post-viral cough', or 'other respiratory symptoms (duration <2 months, duration ≥2 months)'. Data are only reported here for asthma and/or COPD

Missing data: gender, all patients (21), asthma (3), COPD (1); age, all patients (9), asthma (4), COPD (1)

**Number for whom the specified respiratory condition was managed at today's encounter*

†Multiple responses allowed. Percentages are of those with the specified respiratory condition managed at this visit

respiratory condition (eg upper respiratory tract infection) managed at that encounter.

Asthma control and management

Asthma was managed at this visit for 74 patients (n = 288; 25.7%; Table 1), mostly for repeat prescriptions (40.5%) or exacerbations (31.1%), with 16.2% for review. Written action plans were reported for 69 patients (n = 262; 26.3%; 95% CI: 18.0, 34.7), including 13 (n = 31; 41.9%) aged <15 years, 28 (n = 160; 17.5%) aged 15–64 years, and 26 (n = 67; 38.8%) aged ≥65 years. Spirometry was performed within the past two years for 53 patients (n = 271; 19.6%).

Asthma was classified as well controlled for 210 patients (275; 76.4%), partly controlled for 49 patients (n = 275; 17.8%) and uncontrolled for 16 patients (n = 275; 5.8%; Table 2).

Asthma medications

Medication data were available for 280 patients with asthma (Table 2). Of these patients, 243 (86.8%; 95% CI: 82.1, 91.4) used one or more respiratory medications: 189 patients (n = 280; 67.5%) used a SABA and 152 patients (n = 280; 54.3%; 95% CI: 47.6, 61.0) were prescribed an ICS-containing medication, which was combination ICS/LABA for 129 patients (n = 152; 84.9%).

Table 2. Current respiratory medications for patients with asthma, overall and by GP-classified level of asthma control

	All asthma	Well-controlled*	Partly controlled*	Uncontrolled*
Number (%) of asthma patients	288[†]	210 (76.4%)	49 (17.8%)	16 (5.8%)
[95% CI for percentage]		[70.8, 82.0]	[13.2, 22.4]	[1.9, 9.8]
(Number with medication data available)	(280)[†]	(207)	(49)	(16)
	n (%)[‡] [95% CI]	n (%)[‡]	n (%)[‡]	n (%)[‡]
Medications classified by asthma stepwise guidelines[§3,10]				
No respiratory medications	37 (13.2%) [8.6, 17.9]	27 (13.0%)	2 (4.1%)	2 (12.5%)
Step 1: 'As-needed reliever' (SABA +/or SAMA) alone	78 (27.9%) [21.7, 34.0]	64 (30.9%)	8 (16.3%)	5 (31.3%)
Step 2: 'Regular preventer' (ICS, cromone or LTRA)	26 (9.3%) [4.9, 13.6]	21 (10.1%)	3 (6.1%)	2 (12.5%)
Step 3 or 4: 'Stepped-up regular preventer' ICS and LABA[‖]	113 (40.4%) [34.2, 46.5]	79 (38.2%)	27 (55.1%)	6 (37.5%)
ICS and LABA[‖] plus any other respiratory medications[#]	17 (6.1%) [2.8, 9.3]	9 (4.3%)	7 (14.3%)	1 (6.3%)
Other medications, n (% with medication data)				
LAMA with or without other respiratory medications[#**]	16 (5.7%) [2.6, 8.8]	9 (4.3%)	6 (12.2%)	1 (6.3%)
LABA and/or LAMA, with or without any other respiratory medications, but with no ICS[#††]	3 (1.1%) [0.0, 2.3]	3 (1.4%)	0 (0%)	0 (0%)
Oral corticosteroids with or without any other respiratory medications[#]	9 (3.2%) [0.7, 5.8]	6 (2.9%)	3 (6.1%)	0 (0%)

ICS, inhaled corticosteroid (eg Alvesco, Flixotide, Pulmicort, Qvar); ICS and LABA, (eg Seretide, Symbicort); LABA, long-acting ß2-agonist (eg Oxis, Serevent); LAMA, long-acting muscarinic antagonist (eg Spiriva); LTRA, leukotriene receptor antagonist (eg Singulair); SABA, short-acting ß2-agonist (eg Airomir, Asmol, Bricanyl, Ventolin); SAMA, short-acting muscarinic antagonist (eg Atrovent)

Classification of medication treatment steps above is based on the Australian asthma handbook, version 1.2, 2016;[3] however, the daily dose of ICS-containing medications could not be established for all patients. In all medication rows (except 'No respiratory medications') patients could also be taking reliever medications (SABA and/or SAMA).

**On a separate card, GPs were provided with criteria for classifying asthma control (Appendix 2; available online only)*

[†]Of the 288 asthma patients, data on asthma control were missing for 13; of the 280 asthma patients with medication data, data on asthma control were missing for eight. Missing data were removed from analysis

[‡]% = percent of asthma patients with medication data available

[§]These steps were the same in Australian guidelines at the time of the survey[10] and at the time of publication[3]

[‖]ICS and LABA as combination inhaler or separate inhalers

[#]There may be some overlap between these medication groups

***At the time of this survey, tiotropium (Spiriva), a LAMA, was only approved in Australia for treatment of COPD*

[††]Asthma guidelines[3] strongly recommend against use of LABA without ICS due to the risk of severe exacerbations and asthma-related death

A figure showing current Australian stepwise treatment recommendations for asthma can be found at www.asthmahandbook.org.au/figure/show/31

Budesonide/formoterol for 'daily' and 'prn' use was recorded for only one patient, whereas 'prn' treatment was recorded for 11 patients (n = 46; 23.9%) prescribed budesonide/formoterol and eight patients (n = 83; 9.6%) prescribed fluticasone/salmeterol. Two patients with asthma were prescribed a LABA without ICS.

Of the 106 patients aged >5 years who were prescribed 'daily' ICS (with/without LABA), the total ICS daily dose was low for 20.8%, moderate for 49.1% and high for 30.2%.

For patients prescribed any ICS, GPs classified asthma as well controlled for 105 patients (n = 151; 69.5%; 95% CI: 61.7, 77.4), while 17 patients (n = 65; 26.2%) with partly controlled or uncontrolled asthma were taking no respiratory medications or a reliever alone.

COPD severity and management

COPD was managed at this visit for 32 patients (n = 135; 23.7%; Table 1), mostly for review (34.3%) or exacerbations (28.1%), with 18.8% for repeat prescriptions. Over half of the patients with COPD (70/127, 55.1%) had spirometry performed in the previous two years, and 45 (n = 124; 36.3%) had an action plan.

Of the 126 patients with COPD, severity was classified as mild for 42.9% (95% CI: 34.9, 50.8), moderate for 42.1% (95% CI: 34.7, 49.5), severe for 14.3% (95% CI: 7.8, 20.7) and unknown for 0.8% of patients (Table 3).

COPD medications

Of the 128 patients with COPD with medication data (Table 3), 119 (93.0%; 95% CI: 88.0, 98.0) used one or more respiratory medications, most commonly ICS/LABA, prescribed for 78 patients with COPD (n = 128; 60.9%) across all levels of severity. More than one-third of patients (47/128; 36.7%) were prescribed 'triple therapy' (ICS+LABA+LAMA). Only 58 (n = 128; 45.3%) had a SABA recorded.

Of the 51 patients with mild COPD (Table 3), only 29.4% were prescribed a reliever alone or LABA and/or LAMA; 29.4% were prescribed ICS/LABA; and 23.5% were prescribed triple therapy; 13.7% were prescribed no respiratory medications.

Discussion

This study provides a snapshot of the general practice management of asthma and COPD in Australia. Encounters where asthma was managed were mostly for repeat prescriptions or exacerbations, but, encouragingly, more than one-third of COPD encounters were for review. GPs classified asthma as well controlled for more than three-quarters of patients. Although it is difficult to assess the appropriateness of treatment from cross-sectional data, the findings suggest inappropriate prescribing relative to guidelines both at the time of the survey[9,10] and at the time of publication.[3,4,11] For asthma, this included predominant prescribing of moderate–high dose ICS/LABA rather than low-dose ICS; some ICS/LABA being prescribed only for 'prn' use; and two patients at high risk through treatment with LABA alone. Less than 20% of asthma patients aged 15–64 years had an action plan. For COPD, high levels of prescribing combination ICS/LABA and triple therapy, including for mild COPD, were inconsistent with guidelines then[9] and at the time of publication.[4,11]

Asthma, COPD and asthma–COPD overlap

The proportion of patients with asthma for whom SAND data were recorded at an encounter during the study period (11.1%) was similar to the prevalence of asthma in the Australian population (adults: 9.8%; children: 10.4%).[12] The proportion of patients with COPD (5.2%) was similar to the Australian prevalence of self-reported emphysema, chronic bronchitis or COPD in people aged ≥40 years.[13] Patients with features of asthma and COPD ('asthma–COPD overlap') have worse outcomes than patients with either disease alone, but are excluded from most pharmacotherapy studies.[14] In this study, the proportion of patients with asthma or COPD who had both diagnoses (6.3%) was substantially lower than the 15–20% reported elsewhere,[14] including other SAND studies,[15] perhaps because the other SAND studies offered the diagnostic option of 'COPD with asthma'.

Asthma control and management

GPs were asked to assign patients' asthma control category from four specific 'Yes' or 'No' symptom questions; this should have yielded a guidelines-based control assessment (Appendix 2; available online only). However, 76.4% of asthma cases were classified as 'well controlled', much higher than in Australian studies that used validated, guidelines-based, patient-completed questionnaires (54.4% with Asthma Control Test in a large population-based survey;[16] 52.2% with Asthma Control Questionnaire in a SAND study).[17] Interestingly, in the latter study, GPs were also asked to record their 'clinical opinion' of patients' asthma control: they classified 74.5% of asthma cases as well-controlled,[17] similar to the present finding. These results suggest that our symptom questions (which were on a separate card) may have been overlooked. Others have reported overestimation of well-controlled asthma by GPs, compared with guidelines criteria: 59% versus 42% in Canada[18] and 88% versus 30% in Spain.[19]

Overall, 54.3% of patients with asthma were prescribed an ICS-containing preventer, with class and dose distributions similar to national dispensing data:[20] most ICS were prescribed as moderate-dose or high-dose ICS/LABA. This contrasts with guideline recommendations (then[10] and at the time of publication)[3] that, for most patients, asthma can be well controlled with low-dose ICS alone. SABA was recorded for a low proportion of patients (67.5%), compared with 92.6% in a nationally representative patient survey.[16] This difference did not appear to be explained by prescribing of budesonide/formoterol as maintenance and reliever.[21] A more likely explanation is that over-the-counter SABA (purchased by 40% of patients with asthma)[22] may not be captured unless patients are specifically asked.

Only about one-sixth of visits for the management of asthma were for review.

Australian[23] and international[24] studies highlight the difficulty GPs face in convincing patients to return for routine asthma review. However, guidelines[3] suggest visits for repeat prescriptions (about 40% in this study) offer an opportunity for rapid asthma control screening (eg using the Primary Care Asthma Control Screening tool).[25]

Asthma guidelines recommend all patients have a written action plan, to reduce hospitalisations and mortality.[3] The overall rate of action plan ownership found in this study was low (26.3%), particularly for patients aged 15–64 years, but similar to national data (24.0%).[2]

COPD severity and management

Positive features of COPD management were the high proportion of patients having spirometry in the previous two years, and more than one-third having action plans. Evidence supporting action plans for COPD is weaker than for asthma, but they can improve patients' ability to recognise and react appropriately to exacerbations.[26] The distribution of COPD severity between mild, moderate and severe was similar to that in other SAND studies[15] despite differences between the classifications provided.

Most patients with COPD were prescribed an ICS/LABA, which for COPD is only registered and subsidised through the Pharmaceutical Benefits Scheme in Australia

Table 3. Current respiratory medications for patients with COPD, overall and by GP-classified COPD severity

	All COPD	Mild*	Moderate*	Severe*
Number (%) of COPD patients	135†	54 (42.9%)	53 (42.1%)	18 (14.3%)
[95% CI for percentage]		[34.9, 50.8]	[34.7, 49.5]	[7.8, 20.7]
(Number with medication data available)	(128)†	(51)	(53)	(18)
	n (%)‡ [95% CI]	n (%)‡	n (%)‡	n (%)‡
Medications classified by COPD-X stepwise guidelines§[9,11]				
No respiratory medications	9‖ (7.0) [2.0, 12.0]	7 (13.7)	1 (1.9)	1‖ (5.6)
Short-acting reliever medication – SABA +/or SAMA	6 (4.7) [1.1, 8.2]	4 (7.8)	2 (3.8)	0
Long-acting bronchodilator – LABA +/or LAMA, ± reliever	29 (22.7) [15.3, 30.0]	11 (21.6)	11 (20.8)	3 (16.7)
ICS/LABA				
– ICS and LABA# ± reliever	31 (24.2) [16.4, 32.1]	15 (29.4)	14 (26.4)	1 (5.6)
– ICS and LABA# + LAMA ('triple therapy') ± reliever	47 (36.7) [28.5, 44.9]	12 (23.5)	23 (43.4%)	11 (61.1)
Add-on theophylline	0	0	0	0
Other medications (n, % of those with medication data)				
ICS without any LABA or LAMA ± any other respiratory medications**	4 (3.1) [0.0, 6.7]	2 (3.9)	2 (3.8)	0 (0.0)
Oral corticosteroids ± any other respiratory medications	2 (1.6) [0.0, 3.7]	0 (0.0)	0 (0.0)	2 (11.1)

ICS, inhaled corticosteroid (eg alvesco, Flixotide, Pulmicort, Qvar); ICS and LABA (eg Seretide, Symbicort); LABA, long-acting ß2-agonist (eg Oxis, Serevent, Onbrez); LAMA, long-acting muscarinic antagonist (eg Spiriva); SABA: short-acting ß2-agonist (eg Airomir, Asmol, Bricanyl, Ventolin); SAMA: short-acting muscarinic antagonist (eg Atrovent)
Classification of medications is based on the COPD-X guidelines table for 'Stepwise management of stable COPD'.[11] No other respiratory medication was taken, except where indicated
**On a separate card, GPs were provided with the COPD-X[4] criteria for classifying COPD severity (Appendix 2; available online only)*
†Of the 135 COPD patients, data on COPD severity were missing for nine and unknown for one; of the 128 COPD patients with medication data available, data on COPD severity were missing for six. Missing data were removed from analysis
‡% = percent of COPD patients with medication data available
§These steps were the same in Australian guidelines at the time of the survey[9] and at the time of publication[11]
‖Includes one patient who was classified as having severe COPD and using 'Oxygen' only, with no respiratory medications recorded
#Combination ICS/LABA or separate inhalers
***COPD-X guidelines[4,9] recommend against use of ICS without LABA and/or LAMA*
A figure showing current Australian recommendations for stepwise treatment of COPD can be found at www.lungfoundation.com.au/wp-content/uploads/2014/02/LFA-Stepwise-Management-of-COPD_0216_WEB.pdf

for symptomatic patients with a forced expiratory volume in one second (FEV_1) ≤50% predicted and severe exacerbations. Of the patients with 'mild' COPD, more than half were prescribed ICS/LABA, and almost a quarter were prescribed triple therapy with ICS+LABA+LAMA, with little use of LABA and/or LAMA, which is the recommendation for mild COPD.[4,11]

Strengths and limitations

Strengths of this study include that the data were recorded by a representative random sample of GPs, providing an accurate reflection of general practice activity.[7] Limitations include that the data were collected in 2012, and asthma and COPD guidelines have been updated since then (although with little change in recommendations about medication classes). It is difficult to assess the appropriateness of therapy from cross-sectional data, particularly for asthma, where guidelines[3] recommend down-titration during a period of stability after a period of two to three months of good control. Further, GPs may have based their assessment of patients on their own concepts of asthma control and COPD severity, rather than by asking the patient the specific questions that were provided for this purpose. Data were not recorded for many patients presenting with respiratory conditions other than asthma and COPD; therefore, one of the original aims, to examine apparent prescribing of respiratory medications for non-asthma/non-COPD respiratory symptoms,[6] was not achieved. Our findings also suggest some ambiguity in the meaning of 'prn', either as needed for symptom relief, or episodic (eg during winter).

Implications for clinical practice

The findings of this study suggest that GPs may not routinely be asking patients about symptom frequency and SABA use. For this purpose, recently developed quick-screening tools may be helpful for clinical practice.[3,25] Low rates of ownership of asthma action plans are a continuing concern, as they can reduce the risk of asthma-related death.[3] Templates and therapeutic options for action plans are available through current guidelines.[3]

Our findings about treatment, although limited by the cross-sectional survey, align with evidence from national dispensing data[20] that many patients are prescribed high-intensity treatment, particularly ICS/LABA. This pattern has persisted for >10 years,[20] with higher costs for patients and the health system, and increased potential for side effects. Guidelines recommend stepwise treatment as the most cost-effective way of treating asthma and COPD.[3,4,11] However, from the GP's perspective, this may not be the most efficient management approach for clinical practice, particularly when medications are perceived to be safe.[27] For asthma and COPD, which are largely managed in general practice, the factors influencing GP prescribing should be explored, and taken into account in implementing treatment strategies that can improve outcomes and reduce risk for patients and clinicians, while maximising cost-effectiveness and optimising use of scarce health resources.

Authors

Helen K Reddel MBBS, PhD, FRACP, Professor, Central Clinical School, University of Sydney, NSW; Research Leader, Clinical Management Group, Woolcock Institute of Medical Research; Honorary Visiting Medical Officer, Department of Respiratory Medicine, Royal Prince Alfred Hospital; and Chair, Global Initiative for Asthma (GINA) Science Committee. helen.reddel@sydney.edu.au

Lisa Valenti BEc, MMedStat, Senior Research Analyst, Family Medicine Research Centre, Sydney School of Public Health, Sydney Medical School, University of Sydney, NSW

Kylie L Easton BPharm, BPharmSci (Hons), PhD, Formative Research Manager, NPS MedicineWise, NSW

Julie Gordon BAppSc (HIM) (Hons), PhD, Research Fellow, Family Medicine Research Centre, Sydney School of Public Health, Sydney Medical School, University of Sydney, NSW

Clare Bayram BAppSc (HIM) (Hons), PhD, Research Fellow and Project Manager, BEACH program Family Medicine Research Centre, Sydney School of Public Health, Sydney Medical School, University of Sydney

Graeme C Miller MBBS, PhD, FRACGP, Medical Director, Family Medicine Research Centre, Sydney School of Public Health, Sydney Medical School, University of Sydney, NSW

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