

## Supplemental Information

### PUBMED SEARCH STRATEGY

(asthma[mh] OR asthma[tiab])

AND

(guideline[tiab] OR guidelines[tiab] OR practice guidelines as topic[mh] OR consensus conference[tiab] OR consensus statement[tiab] OR consensus statements [tiab] OR recommendation[tiab] OR recommendations[tiab] OR critical pathways [mh] OR critical pathways[tiab] OR critical pathway[tiab] OR clinical pathways[tiab] OR clinical pathway[tiab] OR primary health care/standards[mh])

AND

(guideline adherence[mh] OR adherence [tiab] OR nurse's practice patterns[mh]

OR Physician's Practice Patterns[mh] OR practice pattern[tiab] OR practice patterns[tiab] OR behavior[tiab] OR behaviour[tiab] OR Professional practice [mh] OR "outcome assessment (health care)"[mh] OR quality assurance[mh])

AND

(Physicians[mh] or physicians[tiab] OR physician[tiab] OR general practitioner [tiab] OR general practitioners[tiab] OR GPs[tiab] OR hospitalists[tiab] OR Primary health care[mh] OR Nurses[mh] OR nurses[tiab] OR nurse[tiab] OR physical therapy[tiab] or Physical therapy[mh] OR physical therapist[tiab] OR physical therapists[tiab] OR physiotherapist[tiab] OR physiotherapists[tiab]

OR Respiratory therapy[mh] OR respiratorytherapist[tiab] OR respiratory therapists[tiab] OR Pharmacists[mh] OR pharmacist[tiab] OR pharmacists [tiab] OR health professional[tiab] OR health professionals[tiab] OR health care provider[tiab] OR health care providers[tiab] OR healthcare provider [tiab] OR healthcare providers[tiab] OR pediatricians[tiab] OR pediatrician [tiab] OR paediatrician[tiab] OR paediatricians[tiab] OR specialist[tiab] OR specialists[tiab] OR pulmonologist [tiab] OR pulmonologists[tiab] OR doctor[tiab] OR doctors[tiab] OR allergist[tiab] OR allergists[tiab] OR internist[tiab] OR internists[tiab])

**SUPPLEMENTAL TABLE 4** Summary of SOE for Included Studies for Health Care Process Outcomes

Outcomes	Intervention	No. of Studies/No. of Health Care Providers	SOE	Conclusions	Patient Population, <i>n</i>
Prescriptions for controller medications	Clinical pharmacy support	3/91; 1 RCT, 1 pre-post, 1 nonrandomized	Moderate	The 3 studies were consistent in showing that clinical pharmacy support interventions increase asthma controller medication prescribing. The magnitude of the effect is moderate. OR: 3.80 (95% CI 1.4–10.32); percent increase in patients prescribed controller meds pre and post: 6% to 21%.	Pediatrics: 1; mixed: 0; adults: 1; unspecified: 1
	Decision support	15/1635; 6 RCTs, 9 pre-post	Moderate	Most of the evidence supporting the use of decision support interventions comes from a number of nonrandomized studies consistently showing that decision support interventions can increase health care provider prescriptions for asthma controller medications. The magnitude of effect is large: 2% to 34% in pre-post studies; 2% to 17% in RCTs.	Pediatrics: 7; mixed: 0; adults: 2; unspecified: 6
	Education only	10/451; 6 RCTs, 4 pre-post	Low	The evidence suggests that interventions based on education of clinicians only do not improve prescription of asthma controller medications. The magnitude of effect is small to large in studies (3.5%–50.3% increase in prescribing controller medicines).	Pediatrics: 6; mixed: 1; adults: 1; unspecified: 2
	Feedback and audit	11/1831; 6 RCTs, 4 pre-post, and 1 nonrandomized controlled	Moderate	These studies consistently showed that feedback/audit interventions effectively increase prescriptions for controller medicines by health care providers. The magnitude of the effect is moderate. Effect size: 0.12–0.66. Increases in prescribing controller medications ranged from 15.9% to 52% to 104%. Hazard ratio range: 0.77–1.08.	Pediatrics: 0; mixed: 3; adults: 3; unspecified: 5
	Information only	2/107; 1 RCT, 1 quasi-experimental	Insufficient	Because of inconsistency across studies, evidence is insufficient to determine the effect of information alone on prescribing of asthma controller medication.	Pediatrics: 1; mixed: 0; adults: 0; unspecified: 1
	Multicomponent interventions	7/1141; 4 cluster randomized, 3 pre-post	Low	Two pre-post studies and 1 RCT reported a significant increase in prescribing (25%–49% in pre-post studies); all other effects were null. Overall, the magnitude of effect is small.	Pediatrics: 2; mixed: 0; adults: 1; unspecified: 4
	Organizational change	2/228; 1 RCT, 1 pre-post	Low	Although far fewer studies performed using organizational change (compared with decision support or feedback/audit), the findings consistently showed that organizational change can increase health care provider prescriptions for controller medicines. The effect on prescriptions by health care providers is smaller. The magnitude of effect is small. In the RCT: 8% to 16% for all asthma patients; 4% to 11% for patients with persistent asthma; 4% to 9% for ICS for all asthma patients; 13% to 19% for ICS for patients with persistent asthma. In the pre-post study: 12% increase in ICS.	Pediatrics: 1; mixed: 0; adults: 0; unspecified: 1
	Quality improvement and pay-for-performance	0 studies	Insufficient	No studies identified.	
Self-management education/asthma action plans	Clinical pharmacy support	1/82; 1 RCT	Moderate	The 1 study demonstrated a positive effect in the use of clinical pharmacy support to improve self-management education/asthma action plan use by health care providers. The magnitude of the effect is moderate. Asthma Action Plans: 40% to 45% increase from baseline.	Pediatrics: 0; mixed: 0; adults: 1; unspecified: 0

**SUPPLEMENTAL TABLE 4** Continued

Outcomes	Intervention	No. of Studies/No. of Health Care Providers	SOE	Conclusions	Patient Population, <i>n</i>
	Decision support	10/122–124; 4 RCTs, 6 pre-post	Moderate	A majority of nonrandomized studies consistently favor the use of decision support interventions to improve the provision of self-management education/asthma action plans by health care providers. The magnitude of effect is large: 14% to 84%. Small increases in asthma self-management education were observed in a minority of studies, resulting in an overall low SOE regarding this outcome. The magnitude of effect is small to moderate: 10% to 15%. OR: 1.00; relative risk: 1.40. Despite a number of studies examining feedback/audit, inconsistent results lead to a low SOE for the use of feedback/audit to improve self-management education/asthma action plan use. The magnitude of the effect is low. Self-management education: difference in proportions range from low of 0.7 (95% CI: –15.2 to 16.7) for peak flowmeter use to 12.9 (95% CI: 1.9 to 23.9) for inhaler technique education. Asthma action plans: increase of 7.6% in feedback with benchmark as compared with traditional: 4.5%; asthma education: range pre to post 46% to 133% increase.	Pediatrics: 3; mixed: 2; adults: 1; unspecified: 4
	Education only	5/470; 5 RCTs	Low		Pediatrics: 4; mixed: 0; adults: 1; unspecified: 0
	Feedback and audit	5/336; 3 RCTs, 2 pre-post	Low		Pediatrics: 0; mixed: 0; adults: 1; unspecified: 4
	Information only	0	Insufficient	No studies identified.	
	Multicomponent interventions	6/>637; 2 RCT, 4 pre-post	Low	Magnitude of effect is moderate. Provision of asthma action plan increased 27% to 46% in observational studies. Smaller effect sizes were seen in RCTs (7% of providers and relative rate 1.82).	Pediatrics: 3; mixed: 0; adults: 0; unspecified: 3
	Organizational change	2/24; 1 RCT, 1 pre-post	Low	Both studies favor the use of organizational change to increase patient education/asthma action plan use by health care providers. The magnitude of effect is moderate: 10% to 14%. Inconsistent results with a –3% to 33% change in the provision of asthma action plans. Both observational studies reported increases of 19% to 31% while the negative RCT had evidence of suboptimal practice engagement.	Pediatrics: 1; mixed: 1; adults: 0; unspecified: 0
	Quality improvement and pay-for-performance	3/2213; 1 RCT, 2 pre-post	Low		Pediatrics: 2; mixed: 0; adults: 0; unspecified: 1

If the number of health care provider participants was not reported for a particular study, the “not reported” value was treated as zero for that particular intervention and outcome category.

**SUPPLEMENTAL TABLE 5** Summary of SOE for Included Studies for Clinical Outcomes

Outcomes	Intervention	No. of studies/No. of Health Care Providers	SOE	Conclusions	Patient Population, n
ED visits/hospitalizations	Clinical pharmacy support	1/561 RCT	Insufficient	No conclusion could be made because of imprecise results from 1 study.	Pediatrics: 0; mixed: 0; adults: 1; unspecified: 0
	Decision support	10/820; 4 RCTs, 6 pre-post	Moderate	Nine of 10 studies reported that decision support interventions reduce ED visits/hospitalizations. The magnitude of effect is large in pre-post studies (5%–60%) and small in RCTs (1%–7%).	Pediatrics: 2; mixed: 1; adults: 0; unspecified: 7
	Education only	7/5435 RCTs, 2 pre-post	Low	Overall, because of conflicting results among a number of studies, the low SOE suggests that education only interventions do not reduce asthma ED visits and/or hospitalizations. Magnitude of effect is low. Reductions and increases in ED visits were observed. One study demonstrated significant decreases in hospitalizations; others showed no change or an increase in hospitalizations (+5 to 10.5%).	Pediatrics: 6; mixed: 0; adults: 0; unspecified: 1
	Feedback and audit	2/1251 RCT, 1 pre-post	Insufficient	No conclusions could be made because of conflicting results and low magnitude of effect.	Pediatrics: 0; mixed: 1; adults: 0; unspecified: 1
	Organizational change	4/2522 RCTs, 2 pre-post	Low	Inconsistent results account for the low SOE for organizational change to reduce ED visits/hospitalizations. Magnitude of effect is large in pre-post studies (41% to 54%) and small in RCTs (1% to 7%).	Pediatrics: 2; mixed: 1; adults: 0; unspecified: 1
	Information only	1/131 RCT	Insufficient	Based on a single study with a high risk of bias, there is insufficient evidence to determine the effect of information-only interventions on ED visits/hospitalizations.	Pediatrics: 1; mixed: 0; adults: 0; unspecified: 0
	Multicomponent	1/17 clinics (providers not reported) 1 cohort	Insufficient	There is insufficient evidence to determine the effect of multicomponent interventions on ED visits/hospitalizations because of high rates of participant attrition (low study quality) in the single study included.	Pediatrics: 1; mixed: 0; adults: 0; unspecified: 0
	Quality improvement and pay-for-performance	2/11421 RCT, 1 pre-post	Low	Two studies found no significant change in ED visits and hospitalizations. The RCT had evidence of suboptimal practice engagement. Magnitude of effect is low. ED visits: 2% reduction. Hospitalizations: 5% reduction.	Pediatrics: 1; mixed: 0; adults: 0; unspecified: 1
Missed days of work/school	Clinical pharmacy support	0	Insufficient	No studies identified.	
	Decision support	2/435; 1 RCT, 1 pre-post	Insufficient	There is insufficient evidence to evaluate the effect of decision support interventions on the number of missed days of work/school because of inconsistent results across the 2 studies analyzed.	Pediatrics: 0; mixed: 1; adults: 0; unspecified: 1
	Education only	5/1767; 4 RCTs, 1 pre-post	Insufficient	There is insufficient evidence to evaluate the effect of education only strategies on the number of missed days of work/school from asthma because of imprecise estimates and inconsistent results.	Pediatrics: 3; mixed: 0; adults: 1; unspecified: 1
	Feedback and audit	1/29; 1 pre-post	Insufficient	There is insufficient evidence to evaluate the effect of feedback and audit interventions on the number of missed days of work and school from asthma because of inconsistent results and study design.	Pediatrics: 0; mixed: 0; adults: 0; unspecified: 1
	Information only	0	Insufficient	No studies identified.	

**SUPPLEMENTAL TABLE 5** Continued

Outcomes	Intervention	No. of studies/No. of Health Care Providers	SOE	Conclusions	Patient Population, <i>n</i>
	Multicomponent	1/17 clinics (providers not reported); 1 cohort	Insufficient	There is insufficient evidence to determine the effect of multicomponent interventions on the number of missed days of work/school from asthma because of risk of bias (high rates of attrition) and inconsistent results across clinical sites.	Pediatrics: 1; mixed: 0; adults: 0; unspecified: 0
	Organizational change	1/24; 1 RCT	Low	Organizational change does not reduce missed school days from asthma. The SOE for this conclusion is low.	Pediatrics: 1; mixed: 0; adults: 0; unspecified: 0
	Quality improvement and pay-for-performance	1/511; 1 pre-post	Insufficient	There is insufficient evidence to evaluate the effect of quality improvement/pay-for-performance interventions on the number of missed days of work/school from asthma because of high risk of bias in the single study analyzed.	Pediatrics: 0; mixed: 0; adults: 0; unspecified: 1

If the number of health care provider participants was not reported for a particular study, the "not reported" value was treated as zero for that particular intervention and outcome