INPLASY

Family-Centered Nursing Interventions on Disease Control and Family Management Capacity in Children with Asthma: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 July 2026 and was last updated on 14 July 2026.

INTRODUCTION

Review question / Objective P (Population): Preschool children (aged 3–6 years) with a clinical diagnosis of asthma, and their family caregivers.
I (Intervention): Family-centered care (FCC) nursing interventions, in which family members are treated as equal partners in the care process. These may be delivered through group discussion, home-based education, telephone follow-up, outpatient education, or other structured family-involved formats, with varying intervention duration.
C (Comparison): Routine/usual nursing care.
O (Outcomes):

Primary outcomes: asthma control (Childhood Asthma Control Test, C-ACT score); health-related quality of life (e.g., PAQLQ or comparable scales); lung function (FEV1/FVC).
Secondary outcomes: symptom control rate; family asthma knowledge mastery rate; readmission/rehospitalization rate.

S (Study design): Randomized controlled trials (RCTs), published in Chinese or English, from database inception to December 2025.
Specific objective: To determine whether family-centered nursing interventions, compared with routine care, significantly improve asthma control, quality of life, and lung function in preschool children with asthma, enhance family disease-management capacity, and reduce healthcare resource utilization — and to explore sources of heterogeneity through subgroup analyses (intervention duration, delivery mode, and geographic region).

Condition being studied Asthma in preschool children. Asthma is the most prevalent chronic respiratory disease among children worldwide, with a rising incidence in the preschool population; the global prevalence in children under 5 years is approximately 4.8%. Affected children experience recurrent wheezing, coughing, and shortness of breath, which impair growth, development, and cognitive progress, and lead to increased emergency department visits and hospitalizations,

imposing a heavy burden on families and health systems. Because preschool children depend almost entirely on family members for daily care and health management, inadequate family management capacity is a primary driver of poor asthma control. Improving family-level asthma management is therefore a key link in improving prognosis in this age group.

METHODS

Participant or population Preschool children aged 3–6 years with a clinical diagnosis of asthma (diagnosed according to recognized clinical guidelines/criteria), together with their family caregivers (parents or primary guardians) who participate in the intervention. No restriction is placed on sex, disease duration, asthma severity, country, or care setting (outpatient, community, or home). Children with other serious comorbid chronic respiratory, cardiac, or neurological conditions that would confound outcome measurement are not eligible.

Intervention Family-centered care (FCC) nursing interventions, defined as a collaborative nursing model that treats the family as an equal partner in the care process. Eligible interventions actively involve family caregivers in asthma assessment, decision-making, education, and daily disease management. Delivery formats include, but are not limited to, structured family health education, group discussion sessions, home visits/home-based education, inhalation-device and medication-adherence training, symptom and peak-flow monitoring instruction, telephone or remote follow-up, and individualized family management plans. Interventions may be delivered in outpatient or home settings, alone or in combination, with intervention durations ranging from short-term (≤3 months) to longer programs.

Comparator Routine/usual nursing care, i.e., conventional asthma care without a structured family-centered component. This typically comprises standard pharmacological treatment, general discharge instructions, and conventional outpatient health education, without systematic family participation, structured home follow-up, or individualized family management planning.

Study designs to be included Randomized controlled trials (RCTs) only, including parallel-group and cluster RCTs, comparing family-centered nursing interventions with routine care in preschool children with asthma. Quasi-experimental studies, non-randomized controlled trials, single-arm studies, case series, case reports, reviews, protocols, conference abstracts without full data, editorials, and animal studies are excluded.

Eligibility criteria Additional inclusion criteria:

Studies published in Chinese or English.
Studies reporting at least one of the predefined outcomes, with extractable data (mean, standard deviation, and sample size for continuous outcomes; event counts and totals for dichotomous outcomes).
Full text available.

Additional exclusion criteria:

Duplicate publications or studies reporting overlapping populations (the most complete or most recent report is retained).
Studies in which the intervention is not genuinely family-centered (e.g., education directed only at the child, or purely pharmacological interventions).
Studies with incomplete data where the authors could not be contacted or did not respond.
Studies whose participants fall entirely outside the 3–6-year age range, or in which preschool-age data cannot be separated from mixed-age samples.
Study quality that is unacceptably poor (e.g., critical methodological flaws precluding reliable data extraction).

Two reviewers independently screen titles/abstracts and then full texts; disagreements are resolved by discussion or by arbitration from a third reviewer.

Information sources We will conduct a comprehensive search of both English and Chinese literature. Electronic databases to be searched include PubMed, Embase, and Web of Science, together with additional English and Chinese databases (e.g., the Cochrane Library, CINAHL, CNKI, Wanfang Data, VIP, and CBM) as applicable.
The search will combine subject headings (MeSH/Emtree) with free-text terms across four concept blocks: family-centered care, preschool children, asthma, and randomized controlled trial. For example, the PubMed search strategy is: (family-centered care OR family-focused care) AND (preschool children OR 3–6 years old) AND asthma AND (randomized controlled trial OR RCT). Search strategies will be adapted to the syntax of each database.
The search period runs from the inception of each database to December 2025. Language is restricted to Chinese and English.

Supplementary sources:

Manual searching of the reference lists of all included studies and of relevant systematic reviews (backward citation searching).
Contacting study authors directly to obtain unpublished data, missing outcome data, or clarification of methods.
Trial registries (e.g., ClinicalTrials.gov, Chinese Clinical Trial Registry) and grey literature sources will be checked where relevant to identify unpublished or ongoing trials.

Main outcome(s) Primary outcomes:

Asthma control — measured by the Childhood Asthma Control Test (C-ACT) score at the end of intervention/follow-up. Effect measure: mean difference (MD) with 95% CI.
Health-related quality of life — measured by validated pediatric asthma quality-of-life instruments (primarily PAQLQ; other validated scales accepted). Because multiple scales are used, effect measure: standardized mean difference (SMD) with 95% CI.
Lung function — measured by FEV1/FVC (%). Effect measure: MD with 95% CI.

Secondary outcomes:
4. Symptom control rate — proportion of children achieving adequate symptom control. Effect measure: risk ratio (RR) with 95% CI.
5. Family asthma knowledge mastery rate — proportion of family caregivers achieving a predefined knowledge-mastery threshold. Effect measure: RR with 95% CI.
6. Rehospitalization/readmission rate — proportion of children readmitted during follow-up. Effect measure: RR with 95% CI.
Timing: Outcomes are assessed at the end of the intervention period (interventions range from 2 weeks to 3 months) and at the longest available follow-up (2–12 months).
Analysis: Heterogeneity assessed by I^2; a fixed-effect model is used when I^2 0.1, and a random-effects model when $I^2 \geq 50\%$ or $P \leq 0.1$.

Quality assessment / Risk of bias analysis The methodological quality of all included randomized controlled trials will be assessed using the Cochrane risk-of-bias tool for randomized trials (RoB 2.0). Each study will be evaluated across the following five domains:

Bias arising from the randomization process;
Bias due to deviations from the intended interventions;
Bias due to missing outcome data;
Bias in the measurement of the outcome;
Bias in the selection of the reported result.

For each domain, the signalling questions of RoB 2.0 will be answered, and the domain will be rated as "low risk of bias," "some concerns," or "high risk of bias." An overall risk-of-bias judgement will then be derived for each study: a study is judged to be at high overall risk of bias if at least one domain is rated as high risk, or if multiple domains raise some concerns; a study is judged low risk only if all domains are rated low risk.
The assessment will be performed independently by two researchers. Any disagreement will be resolved through discussion; if consensus cannot be reached, a third senior researcher will arbitrate. Where information necessary for judgement is missing or unclear, the corresponding authors of the primary studies will be contacted for clarification.
Results of the risk-of-bias assessment will be presented in a traffic-light plot and a weighted summary bar plot, and will be used to inform sensitivity analyses (see item 24) and the overall interpretation of the certainty of the evidence.

Strategy of data synthesis Meta-analysis will be performed using RevMan 5.4 software.
Effect measures. For continuous outcomes (e.g., C-ACT score, quality-of-life score, FEV1/FVC), the weighted mean difference (WMD/MD) with 95% confidence interval (CI) will be used when studies employ the same measurement instrument and units. When different instruments or scales are used to measure the same construct (e.g., quality of life measured by PAQLQ and other validated scales), the standardized mean difference (SMD) with 95% CI will be used. For dichotomous outcomes (e.g., symptom control rate, family knowledge mastery rate, readmission rate), the risk ratio (RR) with 95% CI will be calculated.
Heterogeneity assessment. Statistical heterogeneity across studies will be assessed using the χ^2 test and the I^2 statistic. If I^2 0.1, heterogeneity is considered acceptable and a fixed-effect model will be applied. If $I^2 \geq 50\%$ or $P \leq 0.1$, substantial heterogeneity is indicated and a random-effects model will be used. In the presence of significant heterogeneity, its sources will be explored through subgroup analysis and sensitivity analysis.
Data handling. Two researchers will independently extract data using a standardized extraction form, covering: (a) basic study information (author, year, country, sample size); (b) participant characteristics (age, sex ratio, asthma duration); (c) intervention details (duration, frequency, delivery mode [outpatient/home], core FCC content); (d)

comparator details (specific content of routine care); and (e) outcome data (mean, standard deviation, and sample size for continuous outcomes; event counts and totals for dichotomous outcomes). Extracted data will be cross-checked by a second researcher to ensure accuracy. Where data are missing or reported only in figures, study authors will be contacted; if data remain unobtainable, standard imputation methods (e.g., estimating SD from standard errors, CIs, or p-values per Cochrane Handbook guidance) will be applied where appropriate.
Statistical significance. A two-sided $P < 0.05$ will be considered statistically significant for pooled effects, and Z tests will be reported.
Publication bias. If ≥10 studies are pooled for a given outcome, publication bias will be assessed using funnel plots and Egger's test. If <10 studies are available, only a descriptive/qualitative assessment will be performed.
Narrative synthesis. If quantitative pooling is not feasible due to excessive clinical or methodological heterogeneity, or insufficient extractable data, results will be summarized narratively in tabular and descriptive form.

Subgroup analysis Subgroup analyses will be conducted to explore potential sources of heterogeneity and to examine whether the effect of family-centered nursing intervention differs across clinically meaningful strata. The following pre-specified subgroups will be examined:

Intervention duration: ≤3 months vs. >3 months. This examines whether longer-duration family-centered programs produce greater or more sustained improvements in asthma control and family management capacity than shorter programs.
Implementation/delivery mode: outpatient-based intervention vs. home-based intervention. This assesses whether the setting in which family-centered care is delivered modifies its effectiveness, given that home-based delivery may allow more individualized assessment of the family environment and inhaler technique.
Study region: Asia vs. Europe and America. This explores whether differences in healthcare systems, cultural expectations of family caregiving roles, and baseline asthma management practices influence the magnitude of the intervention effect.

Subgroup analyses will be performed for the primary outcomes (C-ACT score, quality-of-life score, and lung function) where a sufficient number of studies is available within each subgroup (generally at least two studies per subgroup). Differences between subgroups will be assessed using the test for subgroup differences (χ^2 test for interaction), with the corresponding I^2 for between-subgroup heterogeneity reported.
Findings from subgroup analyses will be interpreted with caution, as they are observational in nature and may be subject to confounding and reduced statistical power. Where the number of included studies within a subgroup is too small to permit meaningful pooling, results will be described narratively rather than pooled.

Sensitivity analysis Sensitivity analyses will be conducted to test the robustness and stability of the pooled results, and to identify whether any single study or methodological decision disproportionately influences the overall effect estimates. The following pre-specified sensitivity analyses will be performed:

Exclusion of low-quality studies. Studies rated at high risk of bias (i.e., with ≥2 domains rated as high risk of bias on RoB 2.0) will be excluded, and the meta-analysis will be re-run. If the direction and statistical significance of the pooled effect remain unchanged, the result is considered robust.
Exclusion of studies with small sample sizes. Studies with a total sample size <50 participants will be excluded and the analysis repeated, in order to evaluate whether small-study effects materially alter the pooled estimates.
Switching the effect model. Analyses will be repeated by switching between the fixed-effect and random-effects models. Marked changes in the pooled effect size or its confidence interval would indicate that the results are sensitive to the choice of statistical model.
Leave-one-out analysis. Each included study will be sequentially removed and the pooled effect recalculated, to determine whether any individual study exerts undue influence on the overall result.
Alternative effect measures (where applicable). For dichotomous outcomes, results may be re-expressed using an alternative measure (e.g., odds ratio instead of risk ratio) to confirm consistency of conclusions.

Country(ies) involved China.

Keywords family-centered nursing; asthma; children; preschool children; disease management; systematic review; meta-analysis; randomized controlled trial.

Contributions of each author
Author 1 - Yiling Pan.
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