# Self-management interventions to reduce urgent healthcare use in patients with asthma: a network meta-analysis

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## Background

❑ Asthma affects more than 330 million people worldwide, causing 250,000 deaths each year and enormous economic burden.

❑ International guidelines (NICE & BTS/SIGN) recommend the use of self-management education for treating people with asthma.

❑ Self-management (SMI) for asthma could involve varying hours of support from healthcare professionals, different delivery modes or multidisciplinary teams.

❑ We compare and rank the effects of the four models of SMI for managing asthma among adults and children with an aim to guide policy-makers on implementing the most efficient model.

## Methods

We categorised SMIs into four types reflecting varying degree of support by health professionals; a) case management (CM), b) intensive self-management (ISM), c) supported self-management (SSM) and d) pure self-management (PSM) [See handout for full definitions].

Primary outcomes include health care utilisation (HCU) (i.e. hospitalisation/ accident and emergency visit, or any unscheduled visit) and quality of life (QoL).

Analysis was conducted using Bayesian random-effects NMAs and normal likelihood for both outcomes. Models were fit in OpenBugs (version 3.2.3) using uninformative prior distributions. Inconsistency analysis ensured consistency of the network.

Meta-regressions, subgroup analysis (by age) and covariate-adjusted network analyses were performed to assess the effects of pre-specified covariates.

## Results

105 randomised controlled trials (comprising 27,767 participants) between 2000 and 2019 met our inclusion criteria.

**Figure A: Network of evidence for unscheduled healthcare use**
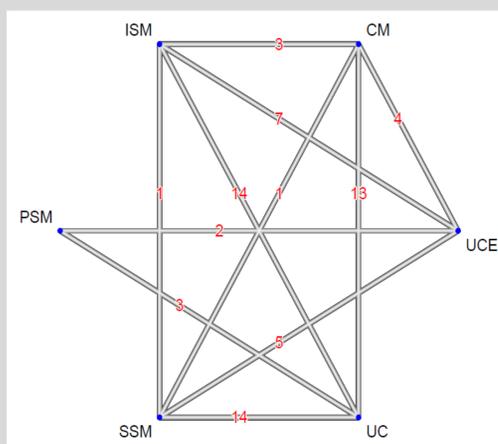


**HCU:** both case-management (SMD=-0.18, 95% CrI: -0.32 to -0.05) and intensive self-management (SMD = -0.30, 95% CrI: -0.46 to -0.15) were significantly better than usual care and other SMIs (figure A)

**QoL:** only intensive self-management (SMD = 0.54, 95% CrI: 0.11 to 0.96) showed a statistically significant increase when compared to usual care

SUCRA ranking indicated intensive self-management as the best model for HCU (97.9%) and for QoL (89.5%) followed by case management. Both intensive self-management and case-management were more effective in the head to-head comparisons for both outcomes (below table).



Light orange: Unscheduled healthcare use; light blue: Quality of life
Data are SMDs (95% CrIs) in the column-defining treatment compared with the row-defining treatment
The certainty of the evidence (according to GRADE) was incorporated in this figure by: *Moderate quality of evidence; †Low quality of evidence; ‡Very low quality of evidence

| | Unadjusted model | Covariate adjusted RE Normal-likelihood model | | | | |
|---|---|---|---|---|---|---|
| Statistic | | Length of intervention | Healthcare setting | Gender | Age | Asthma severity at baseline |
| **Unscheduled healthcare use** Interaction coefficient, median (95% CrI) | - | -0.10 (-0.46, 0.09) | 0.40 (-0.05, 0.85) | -0.15 (-0.51, 0.02) | -0.26 (-0.46, -0.08) | -0.39 (-0.98, -0.06) |
| DIC difference between adjusted and unadjusted models of the same data | 51.84 | 48.21 | 55.69 | 48.15 | 48.03 | 46.06 |
| Residual deviance | 67.17 | 63.18 | 70.84 | 63.05 | 55.90 | 54.52 |
| Heterogeneity SD (median and 95% CrI) | 0.15 (0.07, 0.24) | 0.14 (0.05, 0.23) | 0.18 (0.12, 0.38) | 0.14 (0.05, 0.22) | 0.13 (0.03, 0.21) | 0.07 (0.00, 0.15) |
| Relative % change in the variance | - | 8% | 0% | 5% | 11% | 32% |
| **Quality of life** Interaction coefficient, median (95% CrI) | - | 0.01 (-0.35, 1.13) | -0.46 (-1.48, 0.09) | 0.06 (-0.48, 1.01) | 0.13 (-0.05, 0.39) | 0.45 (0.09, 0.72) |
| DIC (difference between adjusted and unadjusted) models of the same data | 46.45 | 45.98 | 75.09 | 45.79 | 45.32 | 45.21 |
| Residual deviance | 78.33 | 77.95 | 89.44 | 74.56 | 73.73 | 73.75 |
| Heterogeneity SD (median and 95% CrI) | 1.01 (0.84, 1.23) | 1.00 (0.80, 1.20) | 1.10 (0.94, 1.37) | 0.99 (0.81, 1.25) | 0.97 (0.79, 1.20) | 0.84 (0.61, 1.11) |
| Relative % change in the variance | - | 4% | 0% | 4% | 10% | 26% |

DIC=deviance information criterion, SD=standard deviation, CrI=credible interview.

• The 'severity at baseline' was the strongest explanation of heterogeneity and inconsistency in meta-regression analyses (above table).

• Excluding studies mainly involving non-severe patients at baseline, resulted in a 32% reduction in heterogeneity for HCU and 26% for QoL.

**Figure B: Covariate-adjusted network analysis for asthma severity (Key: S=Severe, NS=non-severe)**
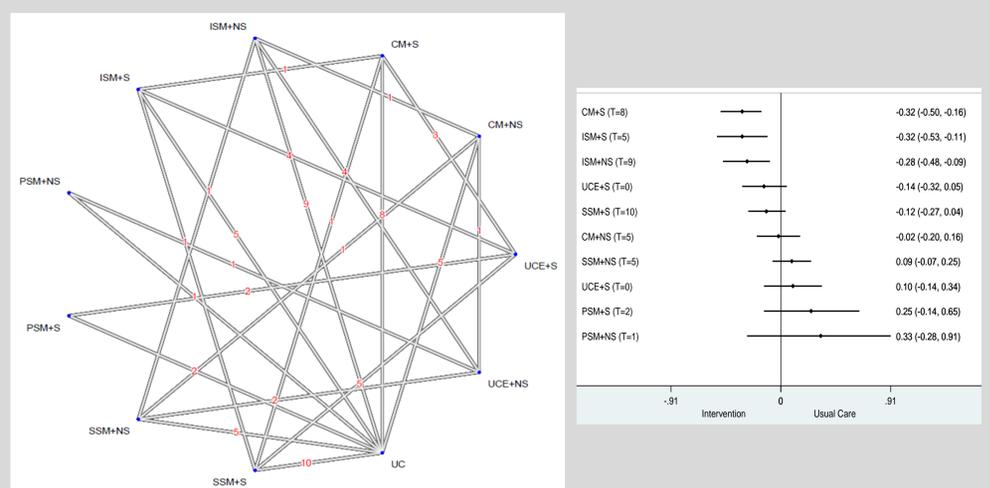


Covariate-adjusted NMAs (figure B) showed both ISM (SMD=-0.32, 95% CrI: -0.53, -0.11) and CM (SMD=-0.32, 95% CrI: -0.50, -0.16) as significant for HCU in studies involving patients with more severe symptoms of asthma.

## Conclusions

❑ This is the largest evidence-base to date by use of network analysis to assess the relative merits of the different SMI models in the treatment of asthma.

❑ Our findings substantially strengthen the clinical basis for the use of SMIs and particularly intensive self-management as first-line choices for treatment of asthma amongst adults, adolescents and children with asthma

❑ This analysis contributes a helpful perspective to aid the development of more accurate guidelines for asthma self-management that will help improve the design concepts of new self-management programmes and influence policy-based decisions for clinical practitioners

## References

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