

# BMJ Open Changing adherence-related beliefs about ICS maintenance treatment for asthma: feasibility study of an intervention delivered by asthma nurse specialists

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## ABSTRACT

**Objectives:** The Necessity–Concerns Framework (NCF) posits that non-adherence to inhaled corticosteroids (ICS) in asthma is influenced by doubts about the necessity for ICS and concerns about their potential adverse effects. This feasibility study examined whether these beliefs could be changed by briefing asthma nurse specialists on ways of addressing necessity beliefs and concerns within consultations.

**Design:** Pre-post intervention study.

**Setting:** Secondary care.

**Participants:** Patients with a diagnosis of moderate to severe asthma who were prescribed daily ICS were recruited to either a hospital care group (n=79; 71.0% female) or intervention group (n=57; 66.7% female).

**Intervention:** Asthma nurse specialists attended a 1.5-day NCF briefing.

### Primary and secondary outcome measures:

Beliefs about ICS (primary outcome) and self-reported adherence were measured preconsultation and 1 month postconsultation. Participants also rated their satisfaction with their consultations immediately after the consultation. Consultation recordings were coded to assess intervention delivery.

**Results:** After the NCF briefing, nurse specialists elicited and addressed beliefs about medicine more frequently. The frequency of using the NCF remained low, for example, open questions eliciting adherence were used in 0/59 hospital care versus 14/49 (28.6%) intervention consultations. Doubts about personal necessity for, and concerns about, ICS were reduced at 1 month postbriefing ( $p<0.05$ ), but the intervention was not applied extensively enough to improve adherence.

**Conclusions:** The intervention changed nurse consultations, but not sufficiently enough to fully address non-adherence or adherence-related ICS beliefs (necessity and concerns). More effective techniques are needed to support nurse specialists and other practitioners to apply the intervention in hospital asthma review consultations.

## Strengths and limitations of this study

- This study reports on the feasibility of delivering a theory-based intervention to modify beliefs within current models of asthma care (asthma nurse consultations).
- Recruitment and retention rates were high for this type of intervention, reducing potential bias in the data.
- Recordings of the study were used to test intervention fidelity robustly.
- As this was a pre–post study, confounders such as changes in nurses' consultations or patient outcomes due to external factors (eg, seasonal variation, receipt of other training) could not be controlled.
- Sample sizes were relatively small (especially of nurses), so we cannot be confident that these findings could extrapolate to nurses and patients at other clinics.

Daily inhaled corticosteroids (ICS) are the most effective method of controlling persistent asthma.<sup>1 2</sup> However, up to 60–70% of asthma patients do not take their ICS as prescribed,<sup>3</sup> with non-adherence associated with increased exacerbations and mortality.<sup>4 5</sup> Addressing non-adherence is 1 of the 10 priorities in the Brussels Declaration for reducing the burden of asthma on individuals and society.<sup>1 6</sup> The reasons for non-adherence are complex, and can include barriers at the healthcare system level, for example, costs and accessibility of healthcare, factors associated with the healthcare provider, for example, whether they have the necessary knowledge and skills to support patients to adhere.<sup>7</sup> At the individual level, these barriers can be summarised as a

combination of perceptual factors (eg, beliefs about illness and treatment) and practical factors (eg, capacity and resources) influencing motivation and ability to adhere.<sup>8</sup>

Studies conducted across long-term conditions including asthma have identified the Necessity-Concerns Framework (NCF) as a useful method for operationalising adherence-related beliefs.<sup>9–11</sup> The framework posits that adherence to medication is influenced by patients' evaluation of treatment, specifically judgements of the personal need for treatment (necessity beliefs) relative to concerns about the potential negative effects (concerns).<sup>11 12</sup> Necessity beliefs are influenced by illness beliefs, treatment experiences and expectations; in symptom-free periods, patients with asthma may question their need for ICS ('no symptoms, no asthma').<sup>8 9 13 14</sup> Concerns often extend beyond experienced side effects to issues including long-term harm and dependency.<sup>8</sup> Beliefs may diverge from medical evidence but can have a 'common-sense' logic, for example, generalising oral high-dose corticosteroid side effects to low-dose ICS.<sup>13–15</sup> Beliefs about specific medicines are related to general attitudes to pharmaceuticals and may be rooted in cultural norms.<sup>16 17</sup>

The NCF was proposed as an extension of Leventhal's Common-Sense Model.<sup>18 19</sup> In this model, internal information (eg, symptoms) and external information (eg, medical advice) are potentially threatening to patients and trigger cognitive and emotional responses in an attempt to manage the threat and its impact on self system. These responses can include evaluations (eg, of the likely consequences of an illness), emotions (eg, fear), and subsequent coping strategies (eg, healthcare seeking). The model recognises that these evaluations and coping strategies are themselves evaluated, and influence future responses to the threat. The NCF extended this model by suggesting that in addition to evaluations of the health threat, perceptions of treatments would also be important in determining treatment-related responses, for example, decisions to uptake and adhere to medication.<sup>19</sup>

Asthma guidelines recommend patient-centred review, including adherence, and that treatment beliefs are addressed.<sup>1 20–22</sup> Recent interventions have addressed treatment beliefs through brief telephone calls from pharmacists and text messages challenging/reinforcing medication and illness beliefs,<sup>23 24</sup> but it is unclear as to how to deliver NCF interventions within the existing models of asthma care.<sup>6 8 25</sup>

In the UK, asthma review is often undertaken by asthma nurse specialists.<sup>1</sup> In this feasibility study, as part of a Medical Research Council (MRC) guidance intervention development process,<sup>26</sup> we examined the effect of an NCF briefing covering causes of non-adherence, and how to identify and address doubts about ICS necessity and concerns on asthma nurse specialists' consultations. We evaluated whether it resulted in more focus on adherence and beliefs about ICS within consultations,

with subsequent improvements in patients' perceptions of ICS, adherence and satisfaction with consultations. We assessed two premises to evaluate the potential efficacy of the intervention: (1) ICS necessity beliefs and concerns predict adherence in this group and (2) that nurse specialists would elicit and address ICS beliefs more frequently postbriefing, indicating fidelity in delivery of the intervention.

## METHOD

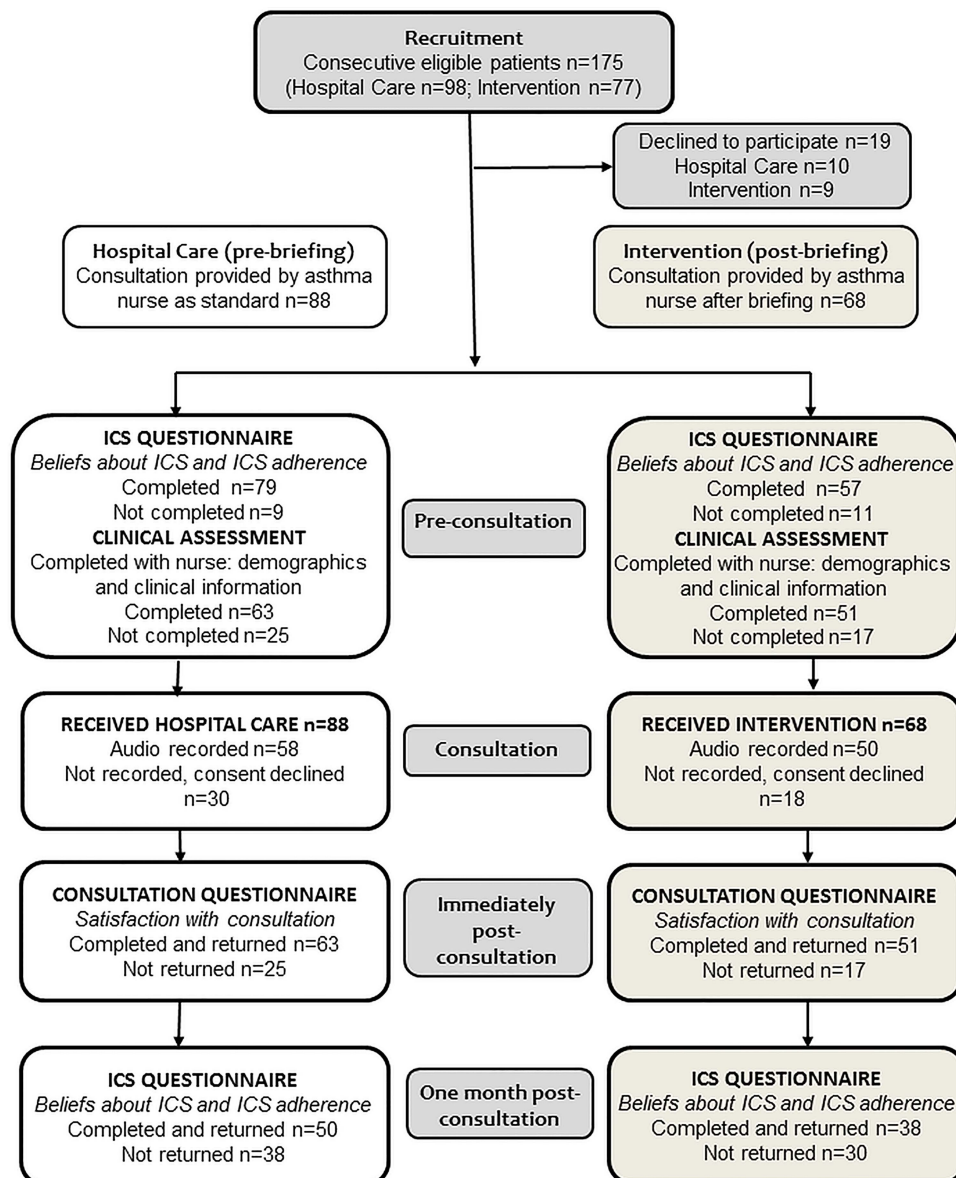
### Design

This study was a pre–post intervention study. We selected this pre-post design for the pilot to enable us to compare nurses' consultations before and after their training. This was a pragmatic decision for the pilot because we did not have the resources to recruit and randomise nurses to receive the intervention training or not, which would have required large numbers of nurses and patients. We used systematic coding of audio recordings of consultations and validated questionnaires given to patients before consultation, immediately after consultation and at 1 month follow-up to assess consultations. We assessed a prebriefing (referred to as the 'hospital care' cohort below) cohort, gave nurse specialists the NCF briefing and then assessed a postbriefing cohort (the 'intervention' group; [figure 1](#)). The study was approved by the South East Multi-Centre Research Ethics Committee.

Participants were recruited and followed up between May 2005 and January 2006. Informed consent was obtained from patients and nurse specialists before participation. For the first 3 months, nurse specialists recruited patients into the hospital care group. Following this, they received their NCF training (see below), and then for a further 3 months they recruited additional patients into the intervention group. Patients completed four questionnaires (see [figure 1](#)). While waiting for their appointment, they completed a paper copy of the pre-consultation ICS Questionnaire and, with the nurse, they completed the clinical assessment. At the end of their consultation, they were handed a paper Consultation Questionnaire with a stamped addressed envelope to complete and return immediately via post to the research team, not their nurse. Finally, the ICS Questionnaire and a stamped addressed envelope were sent to the participants 1 month after their appointment. If participants did not return either questionnaire, they were sent a reminder letter. An individual's questionnaire responses were not disclosed to nurse specialists.

## Participants

Consecutive patients (intervention n=77; hospital care n=98) were included if they were aged 18 years or over and had moderate to severe asthma (as opposed to a mixed pattern). They were recruited by three experienced asthma nurse specialists (two other nurse specialists withdrew after being recruited into the study) from



**Figure 1** Procedure and questionnaire measures.

secondary/tertiary centres at Brighton General Hospital, Guy's Hospital (London) and the London Chest Hospital. In both groups, nearly 90% of eligible participants who were approached by the nurses consented to take part in the study (intervention: 88.7%; hospital care: 89.6%).

### Intervention

The asthma nurse specialists delivered the intervention to participants. They were encouraged to target beliefs about asthma and ICS within their hospital practice and briefed on the rationale behind this approach over one full-day and one half-day sessions. We provided NCF manuals detailing adherence-related beliefs and guidelines for eliciting and addressing these beliefs including a consultation flow chart. The guidelines suggested three consultation components following National Institute for Health and Care Excellence (NICE) guidance:<sup>22</sup> (1)

communicating a no-blame approach to non-adherence to facilitate openness; (2) eliciting ICS necessity beliefs and concerns and (3) addressing doubts about ICS necessity beliefs and concerns (table 1). Separate manual pages were provided for reference during consultations.

### Measures

The ICS Questionnaire contained two scales:

1. The Beliefs about Medicines Questionnaire Specific Asthma version<sup>13</sup> measures beliefs about the personal need for ICS (9 items), for example, *My health, at present, depends on this inhaler*, and concerns about the potential adverse consequences of ICS (12 items), for example, *I sometimes worry about the long term effects of this inhaler*. Statements are endorsed on a Likert-type scale (range 1=strongly disagree to 5=strongly agree). We calculated mean item scores (range 1–5) to facilitate scale comparisons.<sup>27</sup> The Necessity-Concerns

**Table 1** Intervention components

Intervention	Example
Step 1: Provide a 'no-blame' space to report any non-adherence by prefacing the adherence discussion with an accepting statement	<i>"people use their preventer in different ways and it might be different to how the doctor advised you"</i>
Step 2: Elicit patients' beliefs about their personal need for medication including in the absence of symptoms	<i>"do you think you need your preventer even when you don't have symptoms?"</i>
AND	
Elicit concerns about potential adverse effects of medication	<i>"do you have any concerns about taking your preventer medication?"</i>
Step 3: Address concerns or doubts about necessity using example rationales	<i>"you need preventer medication because asthma is permanent, caused by over-reactivity of the lungs and inflammation. Preventer medication works over time to reduce inflammation."</i>
Finally, address any other queries including practical issues	<i>"can you tell me how you are using your spacer"</i>

Differential (NCD) was calculated by subtracting the ICS concerns score from the ICS necessity score (range -4 to 4). It indicates patients' overall evaluation of ICS;<sup>23 28 29</sup> scores are positive if the perceived need for ICS is high relative to ICS concerns. The scale is validated for use in asthma samples and had acceptable reliability at baseline (necessity: Cronbach's  $\alpha=0.83$ ; concerns: Cronbach's  $\alpha=0.80$ ).<sup>13</sup>

- A brief four-item version of the Medication Adherence Report Scale (MARS) was used to measure self-reported adherence to ICS. Each item (eg, *I forget to take my preventer inhaler*) was rated on a Likert-type scale (range 5=never to 1=always).<sup>27</sup> Higher total scores (range 4–20) indicate higher adherence. Items were adapted from the original MARS to apply to asthma preventer medication, and one item, *I take less than instructed*, was omitted from the scale because it was felt by the research team to be ambiguous in the context of inhaled asthma treatment. Since previous studies have estimated that approximately a third of patients may not adhere to their medication, we compared the lowest third of participants on the MARS 'low adherers' ( $\leq 16$ ) with the highest two-thirds 'high adherers' ( $>16$ ).<sup>30</sup> The MARS has been validated;<sup>31</sup> reliability in the current sample was lower than in previous studies

(Cronbach's  $\alpha=0.51$ ). Since this was a new version of the MARS, and the dichotomisation cut-off had not been validated, we conducted two additional sensitivity analyses, first, treating the MARS scores as continuous, and second, using a cut-off to compare people who reported any non-adherence (MARS scores  $<20$ ) to full adherence (MARS scores=20).

The Demographic and Clinical Information Questionnaire was completed with the asthma nurses. Patients reported their age, gender, age on leaving full-time education, ethnicity and marital status. Patients also reported age of asthma onset, if they smoked currently, had relatives with asthma or any comorbid illnesses.

The Consultation Questionnaire contained two scales:

- The Medical Interview Satisfaction Scale (MISS) assesses patient satisfaction with consultations. We omitted two items concerning diagnosis (all participants had an asthma diagnosis), leaving 19 items<sup>32 33</sup> rated on a seven-point Likert-type scale (1=very strongly disagree to 7=very strongly agree). Higher total scores indicate greater satisfaction (range 19–133, Cronbach's  $\alpha=0.76$ ).
- Satisfaction with intervention skills (MP5) was a new scale measuring perceptions of skills targeted by the intervention. It contains five items (figure 2), rated using the seven-point Likert-type scale used in the

- MP5**
1. The nurse gave me a clear understanding of why I need to use my preventer
  2. The nurse helped me understand that asthma is long term and needs regular treatment
  3. The nurse explained why I should use my preventer even when I don't have symptoms
  4. The nurse helped me understand the effect preventer medication has on my body
  5. The nurse provided me with a clear understanding of my asthma

**Figure 2** Intervention-specific skills measure (MP5) items.

MISS. Higher total scores (range 5–35) indicate greater satisfaction with intervention skills. The scale has not been previously validated. It had good reliability, Cronbach's  $\alpha=0.90$ .

### Assessment of fidelity

Consultations were audio recorded and transcribed. Two independent researchers, blind to whether consultations were prebriefing or postbriefing, rated transcriptions for intervention skills using a predefined schedule. For example, we assessed eliciting ICS concerns using *Did the nurse elicit the patient's concerns about the medication?* scored 0='No'; 1='Asked indirectly'; 2='Yes—asked directly'. Responses were collapsed into those where both raters stated that the behaviour was unambiguously present, for example, coded 'Yes—asked directly'. Byrt's prevalence and bias-adjusted  $\kappa$  (PABAK) was used to calculate agreement between raters, in addition to Cohen's  $\kappa$ , which is adversely affected when an outcome has low prevalence.<sup>34</sup> Inter-rater agreement was adequate-good for eliciting concerns ( $\kappa=0.76$ , PABAK=0.80), asking about adherence using a no-blame frame ( $\kappa=0.38$ , PABAK=0.58), addressing all concerns ( $\kappa=0.53$ , PABAK=0.58) and addressing necessity beliefs using the manual ( $\kappa=0.65$ , PABAK=0.76). Agreement regarding whether necessity beliefs were elicited was low,  $\kappa=0.17$  due to the low frequency of elicitations, PABAK=0.68; however, raters agreed on 72% of interviews. Where one rater thought that the behaviour was present and another stated it was not, we erred on the side of caution when resolving these disagreements by assuming that the behaviour was not present. For example, where one rater thought that the nurse had asked about adherence using a no-blame frame, whereas the other rater did not, we coded this as not being present.

### Analysis

**Sample size calculation:** As this was a feasibility study, we did not perform a sample size calculation.

**Missing data:** Mean ICS necessity and concerns values were calculated. Where four or more values were missing, the whole scale was treated as missing; where three or fewer values were missing, the mean of the completed items was used. Analyses were repeated using a data set derived using multiple imputation of missing data. The pattern of results was similar, so original results are reported here.

**Hypothesis testing:** Paired samples within group t tests were used to compare ICS beliefs and adherence at baseline and follow-up in both groups. Between-groups independent samples t tests and  $\chi^2$  were performed to compare the hospital care with the intervention group on demographic and clinical variables, nurses' consultation behaviour and consultation satisfaction; to compare high and low adherers' ICS beliefs; and to compare participants who completed follow-up with those who did not, on demographic and clinical factors, baseline beliefs and adherence. Repeated measures analyses of variance (ANOVAs) were used to test for differences in changes in beliefs between baseline and follow-up between groups. Non-parametric correlations were used to test for associations between beliefs and self-reported adherence at baseline, when adherence was treated as a continuous variable.

## RESULTS

The intervention and hospital care groups did not differ significantly (all  $p>0.05$ ) on the demographic and clinical variables (table 2) at baseline. Forty-eight participants (35.3%) completed the preconsultation ICS Questionnaire but did not complete the follow-up ICS Questionnaire (see figure 1 for details of the flow of participants through the study). Participants who did not continue were younger (mean age=37.37 years, SD=14.61 years) than those who completed the follow-up survey (mean age=50.58 years, SD=16.27 years,  $p<0.001$ ), less likely to report white ethnicity; 17 (17.9%) white participants and 10 (58.8%) other ethnicity participants did not complete the follow-up. There were no other significant differences between those who completed and those who did not.

### Intervention effects

Intervention participants had fewer doubts about their personal need for, and concerns about, ICS at 1 month follow-up, relative to baseline. The NCD at follow-up increased significantly, indicating increased perceptions of ICS necessity relative to concerns about ICS postconsultation (see table 3).

In the hospital care group, patients' necessity and concern beliefs and NCD score did not significantly change after consultation. Repeated-measures ANOVAs with the between-subjects factor of group (intervention or hospital care) and within-subjects factor of time

**Table 2** Baseline demographic and clinical characteristics

	Hospital care (n=63) Mean (SD)	Intervention (n=51) Mean (SD)
Age (years)	46.7 (17.2)*	47.8 (16.6)
Age left education (years)	19.5 (8.74) <sup>†</sup>	18.6 (8.43) <sup>‡</sup>
Age of asthma onset (years)	23.7 (19.7) <sup>§</sup>	22.1 (19.7) <sup>¶</sup>
	n (%)	n (%)
Female	44 (71.0)*	34 (66.7)
White	53 (85.5)*	43 (84.3)
Married	30 (49.2) <sup>¶</sup>	26 (52.0)*
Employed FT/PT	30 (48.4)*	26 (52.0)*
Report comorbid illness	34 (54.8)*	21 (42.9) <sup>¶</sup>
Currently non-smoker	55 (90.2) <sup>¶</sup>	45 (88.2)
Family history of asthma	36 (59.0) <sup>¶</sup>	33 (66.0)*

\*One participant missing data.

<sup>†</sup>Eight participants missing data.<sup>‡</sup>Seven participants missing data.<sup>§</sup>Three participants missing data.<sup>¶</sup>Two participants missing data.

FT/PT, full time/part time.

(baseline or follow-up) for ICS necessity, ICS concerns and the NCD were used to investigate whether changes in beliefs were larger in the intervention group than in the hospital care group. There was a significant main effect of time for ICS concerns  $F(1,82)=4.42$ ,  $p=0.04$  and the NCD  $F(1,82)=11.48$ ,  $p<0.01$ , but not for ICS necessity  $F(1,82)=3.26$ ,  $p=0.07$ . There were no significant main effects of group for ICS necessity  $F(1,86)=0.16$ ,  $p=0.69$ , ICS concerns  $F(1,82)=1.41$ ,  $p=0.24$  or NCD  $F(1,82)=0.72$ ,  $p=0.40$ . Interaction terms indicated that changes in beliefs were not significantly larger in the intervention group than in the hospital care group for ICS

**Table 3** ICS beliefs at baseline and at 1 month follow-up

	Baseline, Mean (SD)	Follow-up, Mean (SD)	
Intervention group (n=38)			
ICS necessity	3.89 (0.63)	4.04 (0.55)	$t(37)=2.25$ , $p=0.03$
ICS concerns	2.54 (0.59)	2.40 (0.65)	$t(37)=2.22$ , $p=0.03$
NCD	1.35 (0.92)	1.64 (0.90)	$t(37)=2.81$ , $p<0.01$
Hospital care group (n=50)			
ICS necessity	3.86 (0.72)	3.97 (0.68)	$t(49)=0.96$ , $p=0.34$
ICS concerns*	2.35 (0.55)	2.31 (0.44)	$t(45)=0.70$ , $p=0.49$
NCD*	1.57 (0.86)	1.71 (0.72)	$t(45)=1.84$ , $p=0.07$

\*n=46.

ICS, inhaled corticosteroids; NCD, Necessity-Concerns Differential.

necessity  $F(1,86)=0.08$ ,  $p=0.77$ , ICS concerns  $F(1,82)=1.37$ ,  $p=0.25$  or the NCD  $F(1,82)=1.18$ ,  $p=0.28$ .

No significant change in reported adherence to ICS between baseline and follow-up was found in either the intervention group,  $z=0.63$ ,  $p=0.53$  or hospital care group,  $z=0.16$ ,  $p=0.87$ . Median MARS scores were similar for both groups (intervention group: baseline median=17.5, follow-up median=18.0; hospital care group: baseline median=18.0, follow-up median=18.0). At follow-up, 10/37 (27.0%) intervention patients were low adherers relative to 9/46 (19.6%) hospital care patients,  $\chi^2(1, n=83)=0.647$ ,  $p=0.44$ . In the sensitivity analyses, the same pattern (no change in adherence) was also seen for participants who reported full adherence (MARS=20) to participants who reported any non-adherence (MARS<20).

Both groups reported high satisfaction with nurse specialists' generic consultation skills and intervention-specific consultation skills (MISS: intervention  $m=110.65$ ,  $SD=18.84$ , hospital care  $m=107.16$ ,  $SD=16.95$ ,  $t(110)=1.03$ ,  $p=0.31$ ; MP5: intervention  $m=28.82$   $SD=5.41$ , hospital care  $m=28.22$ ,  $SD=5.33$ ,  $t(107)=0.58$ ,  $p=0.56$ ).

### Intervention premises

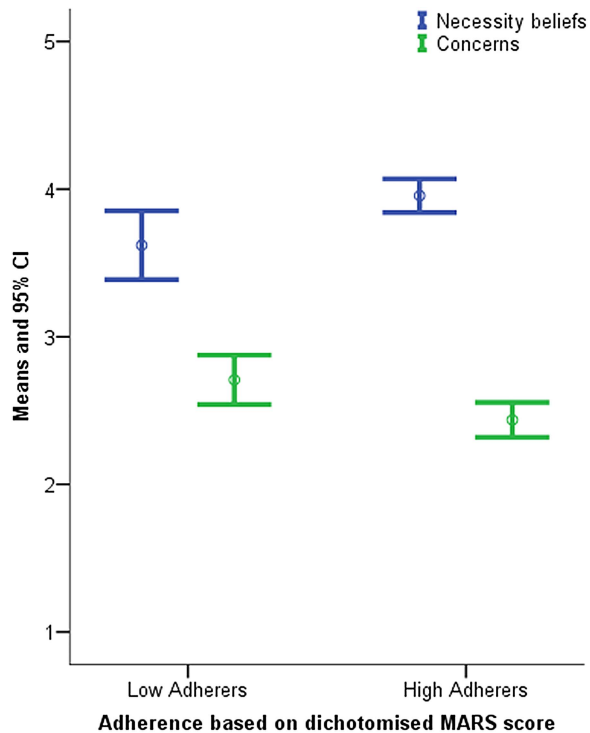
At baseline, low adherers had more doubts about their need for ICS, more concerns about ICS medication and a significantly greater NCD score than high adherers ( $p<0.05$ , table 4 and figure 3). The same pattern was seen if participants who reported full adherence ( $n=33$ ) were compared with those who reported any non-adherence ( $n=97$ ). If continuous MARS scores were used, higher baseline adherence scores were associated with fewer ICS concerns in non-parametric correlations ( $r(130)=-0.30$ ,  $p<0.001$ ), higher belief in personal need for ICS ( $r(130)=0.28$ ,  $p=0.001$ ) and a greater NCD score ( $r(130)=0.37$ ,  $p<0.001$ ). We assessed whether nurse specialists' consultations changed postbriefing for each step (eliciting non-adherence using a 'no-blame' frame, eliciting beliefs, addressing beliefs using a commonsense rationale).

Nurse specialists asked an open question about adherence in 0 hospital care consultations versus 14 (28.6%)

**Table 4** Beliefs about ICS across high and low adherers

	High adherers (n=88), Mean (SD)	Low adherers (n=42), Mean (SD)	
ICS necessity	3.95 (0.53)	3.61 (0.73)	$t(128)=3.01$ , $p<0.01$
ICS concerns	2.44 (0.55)	2.74 (0.55)	$t(128)=2.82$ , $p<0.01$
ICS NCD	1.51 (0.87)	0.88 (0.93)	$t(128)=3.81$ , $p<0.001$

ICS, inhaled corticosteroids; NCD, Necessity-Concerns Differential.



**Figure 3** Inhaled corticosteroids (ICS) necessity beliefs and ICS concerns in patients with high and low adherence, at baseline.

intervention consultations,  $\chi^2(1, n=108)=19.37, p<0.001$ , demonstrating a significant change in consultation style. However, adherence was not elicited in this way in 35/49 (72.4%) consultations postbriefing. Nurse specialists elicited patients' ICS beliefs more frequently after the briefing intervention. Beliefs about ICS necessity in the absence of symptoms were elicited in 9 (18.4%) intervention consultations versus 0 hospital care consultations,  $\chi^2(1, n=108)=11.63, p=0.001$ . ICS concerns were elicited in 31 (63.3%) intervention consultations versus 1 (1.7%) hospital care consultations,  $\chi^2(1, n=108)=48.67, p<0.001$ . Nurse specialists communicated the necessity of taking ICS in the absence of symptoms in 18 (30.5%) hospital care consultations versus 21 (43.8%) intervention consultations,  $\chi^2(1, n=107)=2.00, p=0.13$ . Nurse specialists provided information to address patients' stated concerns about the potential adverse consequences of ICS on 3 (5.1%) occasions prebriefing and 17 (34.7%) occasions postbriefing,  $\chi^2(1, n=108)=15.55, p<0.001$ . Despite this increase, in the majority (32/49) of intervention consultations, ICS concerns were not clearly addressed.

## DISCUSSION

This feasibility study was part of an NCF intervention development process, following MRC guidance.<sup>26</sup> We tested the feasibility of briefing asthma nurse specialists to support adherence by eliciting and addressing adherence-related ICS necessity beliefs and concerns during hospital consultations; examined process variables to evaluate *why* the

intervention did/did not work; indexed fidelity of delivery; and measured patient satisfaction. At follow-up, intervention participants' doubts about ICS necessity and concerns decreased significantly, indicating that adherence-related beliefs are amenable to change. This change coincided with an increase in the frequency with which nurse specialists applied NCF components. This approach was not used consistently, meaning that the intervention effect across the groups was small.

As predicted, ICS necessity beliefs and concerns were related to reported adherence, confirming the premise that addressing these might improve adherence and consistency with NICE guidance<sup>8 22</sup> and a recent meta-analysis.<sup>11</sup> We tested the premise that the briefing would change nurse specialists' consultation behaviour. Postbriefing, nurse specialists used a 'no-blame' frame to ask about adherence in 28.6% of consultations, elicited doubts about the necessity of ICS in 18.6% of consultations, and elicited concerns about the adverse effects of ICS in 63.3% of consultations. Prebriefing, concerns were elicited once, doubts about ICS necessity were not elicited, and nor was an open, 'no-blame' question regarding adherence used. Nurse specialists may need further support to facilitate honest and open discussions of non-adherence as recommended by NICE.<sup>22</sup> However, despite these postbriefing changes, concerns about the adverse effects and doubts about the need for ICS remained unaddressed in most consultations. Discussing but not addressing medication concerns and doubts may reduce the efficacy of the NCF approach. For example, providing a rationale for ICS without eliciting necessity beliefs may prevent appropriate tailoring of the rationale; therefore, we may have demonstrated greater efficacy if fidelity of intervention delivery been high.

In the intervention group, doubts about ICS necessity and ICS concerns were reduced at 1 month after the nurse consultation suggesting that after the briefing, nurse specialists were better able to reassure their patients regarding their asthma treatment. The lack of change in adherence is perhaps not surprising given the high baseline adherence, risking a ceiling effect, and the low fidelity of intervention delivery achieved. We assessed patients' satisfaction with the consultations. Satisfaction scores were high, prebriefing and postbriefing, for both generic skills measured by the MISS and intervention-specific skills measured by the MP5, indicating that patients were typically very satisfied with the nurse specialists' consultations.

This was a feasibility study, and so was not designed or powered to detect a change in intervention outcomes relative to hospital care, explore heterogeneity across sites or between nurses, or evaluate uncontrolled factors (eg, increased experience of the nurse specialists, or change in recruitment style after the briefing resulting in selection bias). We used self-report rather than more objective adherence measures (eg, electronic monitoring). We also relied on the nurses delivering the intervention to recruit participants and hand out

questionnaires. It appears that as the demands of running busy clinics were understandably prioritised above collecting research data, this approach may have resulted in a higher than anticipated level of missing data (eg, for the completion of clinical assessment). A large randomised controlled trial with specifically allocated research assistance and additional adherence measures may resolve these limitations; however, further intervention development is needed. Specifically, given the possible ceiling effects, interventions should target non-adherent patients or those whose ICS perceptions indicate risk of non-adherence. New technologies for supporting consultations in real time and structured NCF scripts or aids may facilitate the identification of these patients, and increase fidelity to the intervention. Training nurse specialists more extensively, for example, over more than two sessions, or changing the briefing content to include techniques such as motivational interviewing, where patients are encouraged to explore ambivalence to increase motivation,<sup>35 36</sup> or cognitive behavioural methods, for example, problem solving, cognitive restructuring,<sup>37</sup> may increase efficacy.

This study confirms the importance of eliciting and addressing patients' ICS necessity beliefs and concerns in relation to non-adherence. The briefing led to increased necessity beliefs and reduced concerns, but the NCF was not implemented consistently, so the effects were small. The NCF intervention is promising, but alternative methods, such as training for nurse specialists and new technologies, should be explored.

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