

Recommendations following a modified UK-Delphi consensus study on best practice for referral and management of severe asthma

David J Jackson,^{1,2} Claire Butler,³ Rekha Chaudhuri,^{4,5} Katie Pink,⁶ Robert Niven,⁷ Samantha Prigmore,⁸ Charlotte Renwick,⁹ James Calvert¹⁰

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For numbered affiliations see end of article.

Correspondence to

Dr David J Jackson;
david.jackson@gstt.nhs.uk

ABSTRACT

Introduction Severe asthma affects an estimated 3%–5% of people with asthma and is associated with frequent exacerbations, poor symptom control and significant morbidity from the disease itself, as well as high dose of inhaled and systemic steroids used to treat it. The introduction of specialist asthma services across the UK has attempted to improve quality of care and ensure that patients undergo a full systematic assessment prior to initiation of advanced biological therapies. However, improvements are required in the patient pathway to minimise avoidable harm.

Objectives To define standards of care in areas where the evidence base is lacking through patient and healthcare professional (HCP) consensus.

Methods The precision UK National Working Group of asthma experts identified 42 statements formed from 7 key themes. An online four-point Likert scale questionnaire was sent to HCPs working in asthma throughout the UK to assess agreement (consensus) with these statements; a subset of the statements formed a patient questionnaire. Consensus was defined as high if ≥75% and very high if ≥90% of respondents agreed with a statement.

Results A total of 117/197 responses (59.3% response rate) were received from severe asthma patients (n=15) and HCPs (n=102) including respiratory physicians, respiratory nurse specialists, respiratory pharmacists, specialist physiotherapists and general practitioners. Consensus was very high in 25 (60%) statements, high in 12 (29%) statements and was not achieved in 5 (12%) statements. Based on the consensus scores, the precision UK National Working Group derived 10 key recommendations. These focus on referrals from primary and secondary care, accessing specialist asthma services, homecare provision for severe asthma patients and outcome measures.

Conclusions Implementation of these 10 recommendations across the severe asthma pathway in the UK has the potential to improve outcomes for patients by reducing delays to assessment and initiation of advanced phenotype-specific therapies.

INTRODUCTION

Severe asthma affects an estimated 3%–5% of people with asthma,¹ and is defined as asthma

Key messages

- What opinions exist (through patient and healthcare professional consensus) to help define standards of care in areas (referral and management of severe asthma) where the evidence base is lacking.
- Based on areas of consensus, 10 key recommendations were derived and focus on referrals from primary and secondary care, accessing specialist asthma services, homecare provision for severe asthma patients and outcome measures.
- Implementation of these 10 recommendations across the severe asthma pathway in the UK has the potential to improve outcomes for patients by reducing delays to assessment and initiation of advanced phenotype-specific therapies.

that remains uncontrolled despite adherence to maximal inhaled therapy, or that worsens when high-dose treatment is decreased.² Data from the UK Severe Asthma Registry highlights that these patients have poor asthma control, impaired lung function, high exacerbation rates and frequent exposure to oral corticosteroids (OCS).³ Severe asthma is associated with very high healthcare costs due to medication use, unscheduled healthcare utilisation and management of OCS-related adverse events.² These costs have been shown to be four times higher for uncontrolled severe asthma patients than the general asthma population.⁴

While the majority of patients with asthma have inhaled corticosteroid (ICS)-responsive, mild-to-moderate disease, which can be routinely managed in the primary care setting, patients with severe disease require systematic assessment including accurate phenotyping within a specialist multidisciplinary secondary or tertiary care setting in which advanced therapies such as biological treatments can be initiated if appropriate.



Despite the introduction of specialist asthma services in many parts of the UK and the increased availability of advanced therapeutic options to manage severe asthma, multiple challenges still remain.

The 2014 National Report into Asthma Deaths⁵ identified a number of areas of practice where improved care could reduce asthma mortality. Among the most frequently cited factors were the failure to:

- ▶ Recognise the risk status of the patient.
- ▶ Provide the right level of asthma expertise.
- ▶ Perform adequate asthma reviews.
- ▶ Refer to an asthma specialist when indicated.

Despite this, according to the Office of National Statistics, there were 1392 deaths from asthma exacerbations in England and Wales in 2018, an increase of 6% since 2017 and a rise of 26% over the previous 5 years.⁶

According to an Asthma UK survey of patients and healthcare professionals (HCPs), patient referrals to a specialist service for diagnosis and management of severe asthma can be delayed by many years. Inconsistent thresholds used to trigger referrals by primary and secondary care as well as a lack of clarity on referral criteria are cited as key reasons for this.⁷ The report highlights capacity and resource challenges (ie, current healthcare provision may be insufficient to support patient numbers) faced by specialist services to manage patients in the most effective way.⁷

The objectives of this work are to build the first UK National Health Service stakeholder consensus for referral of patients with severe asthma into specialist centres and for capacity management within the centre (including workup and provision of advanced therapies).

It is hoped that the development of consensus around the important factors that support the effective and timely management of severe asthma patients through the care pathway will help contribute to an improvement in the care delivered and ultimately, outcomes achieved for these patients.

METHODS

The PRECISION UK National Working Group (an expert steering group of clinicians, authors cited in this work) met in 2020 to review the current landscape and identify and prioritise key topics in the severe asthma care pathway through discussion of existing guidance where it exists (eg, National Review of Asthma Deaths (NRAD), British Thoracic Society/Scottish Intercollegiate Guidelines Network (BTS/SIGN)).

Following the panel meeting, the seven key topics agreed by the PRECISION UK National Working Group were:

1. Necessity to mitigate delays.
2. Patient criteria (stratification) for referral to a specialist asthma service.
3. Role of the referring clinician when referring patients to a specialist asthma service.
4. Initiation of advanced therapies for severe asthma.

5. Clinic capacity issues.
6. Role of homecare.
7. Performance measures.

These topics were systematically explored (with the support of Triducive, Calverton House, two Harpenden Road, St Albans, Hertfordshire AL3 5AB, an independent Delphi facilitator) in order to generate consensus statements that reflected the group's thinking, for testing across a wider audience of clinicians involved in severe asthma care. Forty-two consensus statements were identified by the group to provide insight into the management of severe asthma patients in the UK. This study applied a modified Delphi process via structured communication, reliance on experts and a facilitator, seeking views from peers and utilising anonymity.⁸

The statements were collated into a questionnaire, which was sent out to 197 HCPs identified by the expert steering group as working in severe asthma services in the UK. The responses to consensus statements were analysed in line with Delphi methodology.⁸ Sampling was based on cluster sampling (professional roles based in appropriate centres) and convenience sampling (based on availability and willingness to take part).

Following a modified Delphi process, phase 2 of this process was to select a subset of the statements to gather the opinions of severe asthma patients, these were selected by the expert steering group and validated as being appropriate for patient consideration by a representative of Asthma UK (a patient group). Asthma UK engaged with anonymous severe asthma patients, in receipt of biological therapy, who were randomly sampled from the Asthma UK Volunteer mailing list to provide insight into the patient experience.

For both phases respondents were offered a four-point Likert scale to rate their agreement with each statement, ranging across 'strongly disagree', 'tend to disagree', 'tend to agree' and 'strongly agree'. Completed questionnaires were collated and the individual scores for each statement analysed in order to produce an arithmetic agreement score for each. The online surveys were administered using Microsoft Forms (Microsoft, Redmond, USA).

The PRECISION UK National Working Group predefined agreement for consensus at 75%, a widely accepted threshold.⁹ This was considered a stopping criteria. Consensus was defined as 'high' at $\geq 75\%$ and 'very high' at $\geq 90\%$. The final number of responses included in this analysis was 117 (see figure 1).

Patient and public involvement

A patient group (Asthma UK) was involved from the first step and helped define/validate the research questions (Delphi Consensus statements) and outcome measures (defining threshold for consensus to be deemed as achieved).

Those statements validated as being suitable to be understood and answerable by patients were agreed with

Figure 1: Respondents by role (n=117)



Figure 1 Respondents by role (n=117).

the patient group (Asthma UK) and sent via an online link (via Microsoft Forms) to patients known to Asthma UK who were willing to participate in research (no personal information was made available to any steering group member, facilitator or member of the funding organisation (AstraZeneca).

As a part of the modified Delphi methodology, the statements (research question(s)) were informed by patient priorities, experience and preferences known to be suitable by Asthma UK.

RESULTS

Questionnaires were sent to 197 individuals and completed questionnaires were received from 117 (59.3% response rate) made up of 102 HCPs and 15 patient responders (answering a subset of questions). These were analysed to define the total level of agreement with each of the statements. The combined expert and patient responses were included in the overall agreement levels. All HCPs respondents were professionals involved in the management of people with severe asthma, as shown in figure 1.

Consensus was very high ($\geq 90\%$) in 25 (60%) statements (table 1), high ($\geq 75\%$) in 12 (29%) statements (table 2) and was not achieved in 5 (12%) of statements (table 3). Agreement level by respondent group is shown in the online supplemental file 1.

Four statements reached 100% agreement and were worded as:

- ▶ Patients who require maintenance OCS of at least 5 mg daily for their asthma should be referred to a specialist severe asthma service.
- ▶ Where appropriate, technology-based methods of care should be adopted to improve the ability to meet the patient demand.
- ▶ Not all patients with confirmed severe asthma may be appropriate for virtual (ie, remote) care.
- ▶ Patient-centred performance measures should be established and tracked.

Other consensus statements that achieved greater than 90% agreement are shown in table 1.

Necessity to mitigate delays (statements 1–6)

There was strong agreement for the statement that patients should be seen by a specialist asthma service within 8 weeks (86%) and certainly within 12 weeks

of referral (90%). 100% of patients agreed with the 8 weeks target. Almost all respondents (98%) agreed that waiting times for severe asthma services should be nationally agreed with local processes established to achieve agreed standards. Very high agreement (97%) was also evident that an integrated care pathway (ICP) should be developed and shared for local adaptation and adoption to assist in improving the delivery of care processes to severe asthma patients. An ICP facilitates communication across a multidisciplinary team (MDT) to ensure that an appropriate care plan is implemented for each patient.

It was observed that although only 59% of respondents agreed with the more aspirational standard of 4-week waiting time to see a specialist, this was still the majority of respondents. It would be interesting to explore this further and the authors wonder whether those disagreeing may be influenced by their belief that current resourcing levels will not improve and that 4 weeks is therefore not achievable—even if it is in the patient's best interests. The patient respondents provided a numerically higher level of agreement with this statement (n=15, 73%) compared with HCPs (n=102, 57%).

Patient stratification for referral to a specialist asthma service (statements 7–13)

Consensus was achieved for all statements within this topic with very high consensus for statements 7, 9, 10, 11 and 12 (94%, 97%, 100%, 97% and 92%, respectively). These levels of consensus align with the findings of the NRAD⁶ (2014), which includes the following recommendation:

Patients with asthma must be referred to a specialist asthma service if they have required more than two courses of systemic corticosteroids, oral or injected, in the previous 12 months or require management using British Thoracic Society (BTS) stepwise treatment 4 or 5 to achieve control.

In order to support the accurate identification of suspected severe asthma patients, monitoring of patients in community/primary care settings needs to be in place to capture key metrics that should trigger a referral to the specialist asthma service (eg, levels of oral corticosteroid use, exacerbations and high symptom burden). Community Hubs with diagnostic facilities, to improve access to evidence based diagnostic protocols, should be available for patients to access (81%). This would improve reliability of key diagnostic tests and would permit more accurate triage of suspected severe asthma patients.

Role of the referring clinician when referring patients to a specialist asthma service (statements 14–20)

Adherence to asthma medication is of critical importance to support good asthma care; this view is clearly

**Table 1** Consensus statements achieving very high consensus ($\geq 90\%$)

No.	Topic	Statement	Level of consensus, %
1*	Necessity to mitigate delays	Every patient with suspected severe asthma should be seen within 12 weeks of referral to an appropriate specialist severe asthma service	90
4		Waiting times for accessing specialist severe asthma service† should be agreed and measured nationally and managed locally	98
5*		There needs to be a nationally agreed standard for waiting times for accessing specialist severe asthma service	98
6		An integrated care pathway would help improve the process of delivering care to severe asthma patients	97
7	Patient criteria (stratification) for referral to a specialist asthma service	Patients who continue to exacerbate despite adhering to high-dose inhaled steroid should be referred to a specialist severe asthma service	94
9		Patients who continue to require three or more courses of oral corticosteroids during the last 12 months should be referred to a specialist severe asthma service	97
10		Patients who require maintenance OCS of at least 5 mg daily for their asthma should be referred to a specialist severe asthma service	100
11		Referrals to a specialist severe asthma service† are mandatory if a patient has had a high-risk asthma attack requiring HDU/ITU support in the last 12 months	97
12		Health systems in the NHS should proactively case-find patients who meet criteria and flag for referral to a specialist severe asthma service	92
14		Role of the referring clinician when referring patients to a specialist asthma service	Prior to referral to a specialist severe asthma service, the referring clinicians must assess adherence to ICS of the asthma patient using an objective methodology for example, repeat prescribing on patient summary care records
17		Prior to referral to a specialist severe asthma service†, the referring clinicians must optimise inhaler technique with the asthma patient	99
18*		Prior to referral to a specialist asthma service†, the referring clinicians must offer an Asthma Action Plan to the asthma patient	97
20		The referral to a specialist asthma service should include information of inhaled corticosteroids prescribed	98
23*		Initiation of advanced therapies for severe asthma	Once a patient has been approved by the severe asthma service MDT (or equivalent) for an advanced therapy, initiation of treatment should not be delayed by more than 8 weeks
28*	Clinical capacity issues	Providers and their relevant commissioners should ensure that their specialist centres have sufficient resources to meet patient demand	97
29		At present, there is insufficient resource to ensure that specialist centres meet patient demand	90
30		Where appropriate, technology-based methods of care should be adopted to improve the ability to meet the patient demand	100
31*	Role of homecare	All patients with confirmed severe asthma, on monoclonal antibodies, should have access to homecare, where clinically appropriate	97
32*		In accordance with local guidance, homecare should be offered as soon as is clinically appropriate	96
34*		Severe asthma patients receiving homecare should have appropriate access to their clinician when required	98
36		Not all patients with confirmed severe asthma may be appropriate for virtual (ie, remote) care	100
37*		The shift to remote delivery of severe asthma care should not exclude those that do not have access to the relevant technology	93

Continued

Table 1 Continued

No.	Topic	Statement	Level of consensus, %
38	Performance measures	Patient-centred performance measures should be established and tracked	100
39		Results of performance measures should be published	91
42		National guidelines and statements relating to severe asthma care should be published from a single authoritative source	91

*Statements shared with patients.

†Or equivalent specialist service for Wales, Scotland and Northern Ireland.

HDU, high dependency unit; ICS, inhaled corticosteroid; ITU, Intensive treatment unit; MDT, multidisciplinary team; NHS, National Health Service; OCS, oral corticosteroid.

supported by HCPs (96%). There was also strong consensus (99%) that inhaler technique must be optimised in primary care prior to a referral. To support this, HCPs require appropriate training on how to optimise inhaler technique. Patients should also be offered a written Personal Asthma Action Plan.^{5 10}

In 2018, Asthma UK¹¹ reported that three out of five asthma patients did not receive all elements of basic asthma care defined as:

- ▶ An annual asthma review.
- ▶ A written asthma action plan.
- ▶ An inhaler technique check with a HCP.

Table 2 Consensus statements achieving high consensus (≥ 75 and $< 90\%$)

No.	Topic	Statement	Level of consensus, %
2*	Necessity to mitigate delays	Every patient with suspected severe asthma should be seen within 8 weeks of referral to an appropriate specialist severe asthma service	86
8	Patient criteria (stratification) for referral to a specialist asthma service	Patients who continue to require two or more courses of oral corticosteroids during the last 12 months should be referred to a specialist severe asthma service	85
13		Severe asthma patients need access to community diagnostic hubs	81
15	Role of the referring clinician when referring patients to a specialist asthma service	The referral to a specialist severe asthma service should include information of the ratio of inhaled corticosteroid prescriptions collected to total inhaled corticosteroid prescriptions provided	88
16		The referral to a specialist severe asthma service† should include information of the ratio of inhaled corticosteroids prescribed and prescriptions collected	86
19*		Primary care should refer patients suspected with severe asthma directly to a specialist severe asthma service	76
22*	Initiation of advanced therapies for severe asthma	Once a patient has been approved by the severe asthma service† MDT (or equivalent) for an advanced therapy, initiation of treatment should not be delayed by more than 12 weeks	88
24*		Once a patient has been approved by the severe asthma service† MDT (or equivalent) for an advanced therapy, initiation of treatment should not be delayed by more than 4 weeks	75
25		MDT (or equivalent) meetings (to decide about advanced therapies) should occur at least monthly and should review every systematically assessed case	85
35*	Role of homecare	Virtual (ie, remote) care delivery is appropriate for (welcomed by) most asthma patients	79
40	Performance measures	Severe asthma centre performance measures should be available in the public domain	88
41		Commissioning decisions should be informed by performance measures	78

*Statements shared with patients.

†Or equivalent specialist service for Wales, Scotland and Northern Ireland.

MDT, multidisciplinary team.

**Table 3** Consensus statements not achieving consensus (<75%)

No.	Topic	Statement	Level of consensus, %
3*	Necessity to mitigate delays	Every patient with suspected severe asthma should be seen within 4 weeks of referral to an appropriate specialist severe asthma service	59
21	Initiation of advanced therapies for severe asthma	If a patient's adherence to ICS has already been assessed as adequate, prior to referral, using an objective method, then it is not necessary to repeat this before initiating advanced therapy treatments to severe asthma patients	48
26		MDT (or equivalent) meetings (to decide about advanced therapies) should occur at least weekly and should review every systematically assessed case	62
27		Instead of a full MDT discussion, two senior clinicians should review every systematically assessed case to initiate a biologic at the severe asthma service	40
33*	Role of homecare	Considering patient preference, home initiation of biologics should be the default way to initiate these medicines to severe asthma patients	44

*Statements shared with patients.

ICS, inhaled corticosteroid; MDT, multidisciplinary team.

Achieving the minimum standards of asthma care as recommended by national guidance would seem the minimal acceptable threshold for a referral, and this has been supported by the consensus.

Consensus was achieved for Statement 19 (76%, table 2), largely due to the very strong agreement from patients and pharmacists (both 93%). Overall, respondents agree that general practitioners (GPs) should refer appropriate patients directly to a severe asthma service for assessment where referral criteria are met.

In order to reduce delays in the diagnosis and treatment initiation of severe asthma patients, it is important that key data are included in the referral to a specialist asthma service, these include:

- ▶ Current ICS prescribed.
- ▶ Ratio of ICS prescriptions dispensed to ICS prescriptions collected.
- ▶ Baseline assessments of adherence.

Clarity should be provided to primary care teams on the criteria that should be used to assess and refer patients appropriately and swiftly for specialist assessment. This may be supported by tools such as checklists and could be linked to the electronic patient record.

Initiation of advanced therapies for severe asthma (statements 21–27)

Statement 21 (table 3) failed to achieve consensus levels with only 48% agreeing that if the patient's adherence has already been assessed as adequate then that assessment need not be repeated in the specialist setting. This suggests that there either may be a lack of clarity between referring and referred clinicians or that there are low levels of confidence in assessment methods available in non-specialist settings. There are, however, some signs that changes in service delivery (see National Institute of Clinical Excellence (NICE) COVID-19 rapid guideline: severe asthma)¹² in response to the COVID-19 pandemic have reduced the significance of these barriers.

Statements 22–24 regarding time to treatment initiation all achieved consensus agreement, this provides a strong recommendation that once an advanced therapy is approved for a patient, treatment initiation should not be delayed by more than 4 weeks.

Respondents agree (85%) that MDT meetings should occur at least monthly and should review every systematically assessed case. There was low agreement with statement 27 (40%) which tested replacing the requirement for a full MDT discussion with a review by two senior clinicians instead.

Clinic capacity issues (statements 28–30)

All statements in this topic achieved very high levels of consensus (28%–97%; 29%–90%; 30%–100%) indicating that there is a strong belief that there is currently insufficient resource available within specialist centres to meet patient demand and that healthcare commissioners should identify how these demands can best be met.

As described previously, it is possible that the low response to statement 3 stating that waiting times to see a specialist be no more than 4 weeks (59%) may be an acknowledgement that resources are insufficient to meet current demand and that appropriate commissioned services would be required to achieve this target. It should, however, be noted that this should not affect the aspiration to achieve better care and timely patient management; this aligns with the agreement that patients should be seen by a specialist asthma service within 8 weeks of referral (statement 2, 86%).

Challenges to capacity in severe asthma care, especially in light of the COVID-19 pandemic include the ability to undertake patient assessments (eg, assessment of lung function) while maintaining patient and HCP safety. Specific areas of resource include:

- ▶ Specialist pharmacy.
- ▶ Qualified doctors, nurses and other clinicians.
- ▶ Access to homecare.

► Facilities for virtual consultations.

Technological solutions may offer opportunities to reduce demand, and while local needs may differ, another potential opportunity is the use of community diagnostic hubs and/or secondary care support to undertake patient workup prior to specialist centre intervention. In response to mounting capacity demands, there may be an opportunity to consider how specialist services are delivered. For example, the potential to initiate patients on biological treatments outside of specialist centres (with appropriate specialist MDT agreement).

Role of homecare (statements 31–37)

The need for access to homecare services for patients prescribed biological treatment is supported strongly (97%) and should be offered as soon as is clinically appropriate (96%), but there was no agreement for this to become the ‘default’ method to initiate biologics provision (44%), and this was echoed in the overall response from patients (53%). The use of homecare services has increased dramatically with the advent of the COVID-19 pandemic but there is no current national consensus on when biological treatments should be considered for homecare. As a result, there is variation in opinion regarding the point where patients should be considered suitable for treatment under homecare services.

Although there was strong acceptance among HCPs regarding the utility of homecare services, patients had a lower level of agreement to statements 31 (73%) and 32 (80%) suggesting that HCPs should consider the preferences of the individual patient when considering suitability for homecare.

Most patients are able to access virtual care methods (patient agreement=80%), but it should be acknowledged that survey itself required a level of competence with virtual methods which suggests potential bias. Some patients will require some face-to-face contact with their HCPs and 93% of patients agree that patients receiving homecare should have appropriate access to their clinician when required.

Performance measures (statements 38–42)

Performance measures within healthcare services usually fall into one of two categories:

1. Pathway measures.
2. Patient outcome measures.

There is clear support among respondents that performance measures for severe asthma services should be published in the public domain (eg, added to national dashboards). These measures should provide clear information on which commissioners can base decisions to improve the local delivery of severe asthma care (78%). They should also clearly align with national guidance published from a single authoritative source (91%), although no such guidance currently exists. Patient-centred performance measures should be established (100%) to contribute to the key performance indicators

for specialist asthma services. The authors have offered the following potential suggestions:

- The proportion of patients remaining on maintenance OCS for asthma (excluding use for adrenal insufficiency) at 12 months following biological initiation should be a patient outcome measure.
- The proportion of patients achieving a reduction in OCS for asthma at 6 months following biological initiation should be an outcome measure.
- The proportion of patients achieving improvement in Asthma Control Questionnaire or Asthma Quality of Life Questionnaire at 6 months following biological initiation should be a patient outcome measure.

DISCUSSION

There was generally a very high level of agreement across a large number of the statements tested. There were some differences in agreement levels between the different roles but generally these were not substantial.

Only one round of questionnaire was required, but the PRECISION UK National Working Group noted that several statements were designed to gauge respondent agreement across a range of options, thus, a response below threshold agreement was anticipated. Patient responses were sought (no sample size was aimed for) and is comparable with other professional roles (n=15, see [figure 1](#)), but the sample size is small and selective from a volunteer base of patients who are on biological treatment. The number of responses from GPs (n=3) was low and, therefore, the experience of primary care may be under-represented in the results.

The results of the survey represent current opinions of the respondents. They do not represent best practice for which a higher level of evidence is required. However, they may contribute to identify area in which future research is needed to guide clinical practice.

The PRECISION UK National Working Group were able to form a strong set of recommendations based on the high levels of agreement achieved for most statements. These recommendations are intended to improve the management of severe asthma patients and associated outcomes for patients. By defining clear targets around the time from referral to assessment by specialist asthma service, the need for initiation of appropriate patients on biological therapy within 4 weeks of MDT approval and the provision for direct referral from primary/secondary care to specialist services in appropriate patients, delays in diagnosis of severe asthma and access to advanced treatments should be reduced.

Patient outcomes and performance measures are also recommended along with the need for clear national guidance around service provision for severe asthma patients. These key metrics should provide insight into the patient experience and assist in service improvement activity.

The recommendations also outline ways that a common set of outcomes data can be developed and agreed for

national publication to provide transparency and stimulate the sharing of good practice among specialised asthma services.

The PRECISION UK National Working Group suggest that there is an opportunity to consider some of the issues raised by this consensus project in future guidelines from national bodies such as NICE, BTS and SIGN.

Recommendations

Primary/secondary care referrals to specialist asthma services

1. The guidance that patients requiring two or more courses of OCS in the last 12 months require referral should be emphasised in national targets to stratify and prioritise patients for referral to a specialist centre.
2. Baseline assessment of medication adherence for patients should be made available to the specialist but should not be a barrier to referral if other referral criteria are met.
3. Patients should be referred directly into a severe asthma network (or service) by both primary care or secondary teams based on agreed criteria being met.

Specialist asthma services

1. Every patient with suspected severe asthma should be seen within 8 weeks of referral to an appropriate specialist severe asthma service.
2. Once a patient has been approved by the severe asthma service MDT (or equivalent) for an advanced therapy, initiation of treatment should not be delayed more than 4 weeks.
3. Severe asthma patients need access to community diagnostic hubs (S13) and service innovation.

Homecare provision for severe asthma patients

1. Management of severe asthma patients should support the role of homecare for suitable patients.
2. Severe asthma patients receiving homecare should have access to their specialist when required.

Outcome measures and national guidance

1. Suggested pathway process metrics should include time to referral to a specialist asthma service (or equivalent specialist service for Wales, Scotland and Northern Ireland), time to MDT assessment and time to initiation of advanced therapies, if indicated.
2. National guidance is needed regarding the referral, capacity management and workup of severe asthma patients. online supplemental file 1

Author affiliations

¹Guy's Severe Asthma Centre, Guy's and St Thomas' NHS Foundation Trust, London, UK

²School of Immunology & Microbial Sciences, King's College London, London, UK

³Belfast City Hospital, Belfast, UK

⁴Respiratory Medicine, Gartnavel General Hospital, Glasgow, UK

⁵University of Glasgow, Glasgow, UK

⁶Cardiff and Vale University Health Board, Cardiff, UK

⁷MAHSC, Manchester, UK

⁸St George's University Hospitals NHS Foundation Trust, London, UK

⁹Policy and External Affairs, Asthma UK, London, UK

¹⁰Aneurin Bevan University Health Board, Newport, UK

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REFERENCES

- 1 Asthma UK. Available: <https://www.asthma.org.uk/advice/severe-asthma/what-is-severe-asthma/> [Accessed 16 Apr 2021].
- 2 Global Initiative for Asthma (GINA). *Difficult to Treat & Severe Asthma in adolescent & adult patients. Diagnosis & Management*, 2019.
- 3 Jackson DJ, Busby J, Pfeffer PE, et al. Characterisation of patients with severe asthma in the UK severe asthma registry in the biologic era. *Thorax* 2021;76:220–7.

- 4 Kerkhof M, Tran TN, Soriano JB, *et al*. Healthcare resource use and costs of severe, uncontrolled eosinophilic asthma in the UK general population. *Thorax* 2018;73:116–24.
- 5 Royal College of Physicians. *Why asthma still kills: the National review of asthma deaths (NRAD)*, 2014.
- 6 Office for National Statistics. *Deaths from asthma, respiratory disease, chronic obstructive pulmonary disease and flu, England and Wales, 2001-2018 occurrences*, 2020.
- 7 Asthma UK. *Slipping through the net: the reality facing patients with difficult and severe asthma*, 2018.
- 8 Dalkey N, Helmer O. An experimental application of the Delphi method to the use of experts. *Manage Sci* 1963;9:458–67.
- 9 Diamond IR, Grant RC, Feldman BM, *et al*. Defining consensus: a systematic review recommends methodologic criteria for reporting of Delphi studies. *J Clin Epidemiol* 2014;67:401–9.
- 10 Asthma UK. Your asthma action plan. Available: <https://www.asthma.org.uk/advice/manage-your-asthma/action-plan/> [Accessed 16 Apr 2021].
- 11 Asthma UK. *The reality of asthma care in the UK: annual asthma survey 2018 report*, 2018.
- 12 NICE. *COVID-19 rapid guideline: severe asthma [NG166]*, 2020.

APPENDIX: AGREEMENT LEVEL BY RESPONDENT GROUP

Statement number	Respiratory Specialist Doctor (n=51)	Respiratory Specialist Nurse (n=27)	Pharmacist (n=15)	Physiotherapist (n=4)	Clinical Psychologist (n=1)	General Practitioner (n=3)	Patient (n=15)
1	94%	81%	93%	100%	100%	100%	80%
2	90%	74%	87%	75%	100%	67%	100%
3	45%	70%	60%	75%	100%	67%	73%
4	96%	100%	100%	100%	100%	100%	
5	96%	100%	100%	100%	100%	100%	100%
6	94%	100%	100%	100%	100%	100%	
7	96%	89%	93%	100%	100%	100%	
8	84%	78%	100%	100%	100%	67%	
9	100%	93%	100%	100%	100%	67%	
10	100%	100%	100%	100%	100%	100%	
11	96%	96%	100%	100%	100%	100%	
12	94%	85%	93%	100%	100%	100%	
13	80%	74%	93%	100%	100%	67%	
14	94%	100%	93%	100%	100%	100%	
15	82%	100%	93%	100%	100%	33%	
16	78%	100%	93%	100%	100%	33%	
17	100%	100%	100%	100%	100%	67%	
18	96%	96%	100%	100%	100%	100%	93%
19	67%	70%	93%	100%	100%	67%	93%
20	96%	100%	100%	100%	100%	100%	
21	49%	48%	53%	25%	0%	33%	
22	90%	85%	87%	100%	100%	100%	80%
23	92%	89%	87%	100%	100%	100%	93%
24	73%	78%	80%	100%	100%	67%	67%
25	90%	74%	87%	75%	100%	100%	
26	59%	48%	93%	75%	100%	33%	
27	41%	41%	40%	25%	100%	33%	
28	100%	96%	100%	100%	100%	100%	87%
29	92%	78%	100%	100%	100%	100%	
30	100%	100%	100%	100%	100%	100%	
31	100%	100%	100%	100%	100%	100%	73%
32	96%	100%	100%	100%	100%	100%	80%
33	43%	37%	33%	50%	100%	100%	53%
34	98%	100%	100%	100%	100%	100%	93%
35	86%	67%	87%	25%	0%	100%	80%
36	100%	100%	100%	100%	100%	100%	
37	92%	89%	100%	100%	100%	100%	93%
38	100%	100%	100%	100%	100%	100%	
39	86%	100%	93%	75%	100%	100%	
40	86%	93%	87%	75%	100%	100%	
41	76%	81%	87%	50%	100%	67%	
42	96%	85%	100%	50%	100%	67%	