

The effectiveness of early intervention for children and young people

Evidence from the Itchy Sneezzy Wheezy project

A report to Imperial College Healthcare NHS Trust and NIHR CLAHRC Northwest London

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Executive Summary

This aim of this report is to provide a summary of the evidence of the Itchy Sneezzy Wheezy (ISW) initiative: a scheme run in Inner North West London targeted at improving detection and treatment of allergic conditions amongst children and younger people.

This report summarises the general benefits as identified from the wider literature associated with early interventions amongst children and younger people. It then proceeds to report the impact of ISW on patients reported outcomes as well as emergency admissions and A&E attendances, as observed.

This document can be viewed as an initial business case, highlighting the potential health and financial benefits expected by implementing ISW to others areas, e.g. Outer North West London CCGs as an indicator of the potential health and financial benefits expected by implementing ISW.

Table 1 below uses data from Ealing CCG in Outer North West London as an example of the potential benefits in terms of reduced emergency admissions that are feasible if there was a roll-out of the ISW initiative, and the benefits observed in Inner North West London were replicated.

Across Ealing, the overall emergency admission rate had reduced by 7% between the period April 2010 - March 2011 and November 2012 - October 2013.

However, according to the ISW Integrated Allergy Care for Children report (2013), the results from INWL where the ISW programme was running showed a greater reduction in admission rate, of 23%.

Therefore, if Ealing CCG had seen the same reduction in emergency admissions as INWL, 263 admissions would have been avoided, which corresponds to an estimated cost savings of £391,125. This would mean a net difference of 187 additional avoided admissions compared to the observed counterfactual reduction, which would have generated additional cost savings of £278,282 over this period.

Table 1 Ealing CCG emergency admissions

	Number of Emergency Admissions	Emergency admissions per 1000 population	Reduction	Admissions avoided	Costs saved
Apr 2010- Mar 2011 (Baseline Period)	1089	13.5			
Nov 2012- Oct 2013 (Comparison Period)	1048	12.6	-7%	76	£112,843
Nov 2012- Oct 2013 With ISW	861	10.4	-23%	263	£391,125

Source: NW London CSU data warehouse.

I.0 Background evidence

Allergic conditions, especially asthma, are becoming increasingly common across the world, especially amongst younger people.¹ The international Study on Asthma and Allergies in Childhood (ISAAC), the first worldwide study carried to create a reliable global map of patterns of childhood allergies, placed the United Kingdom amongst the countries with the highest incidence of allergic symptoms among children.²

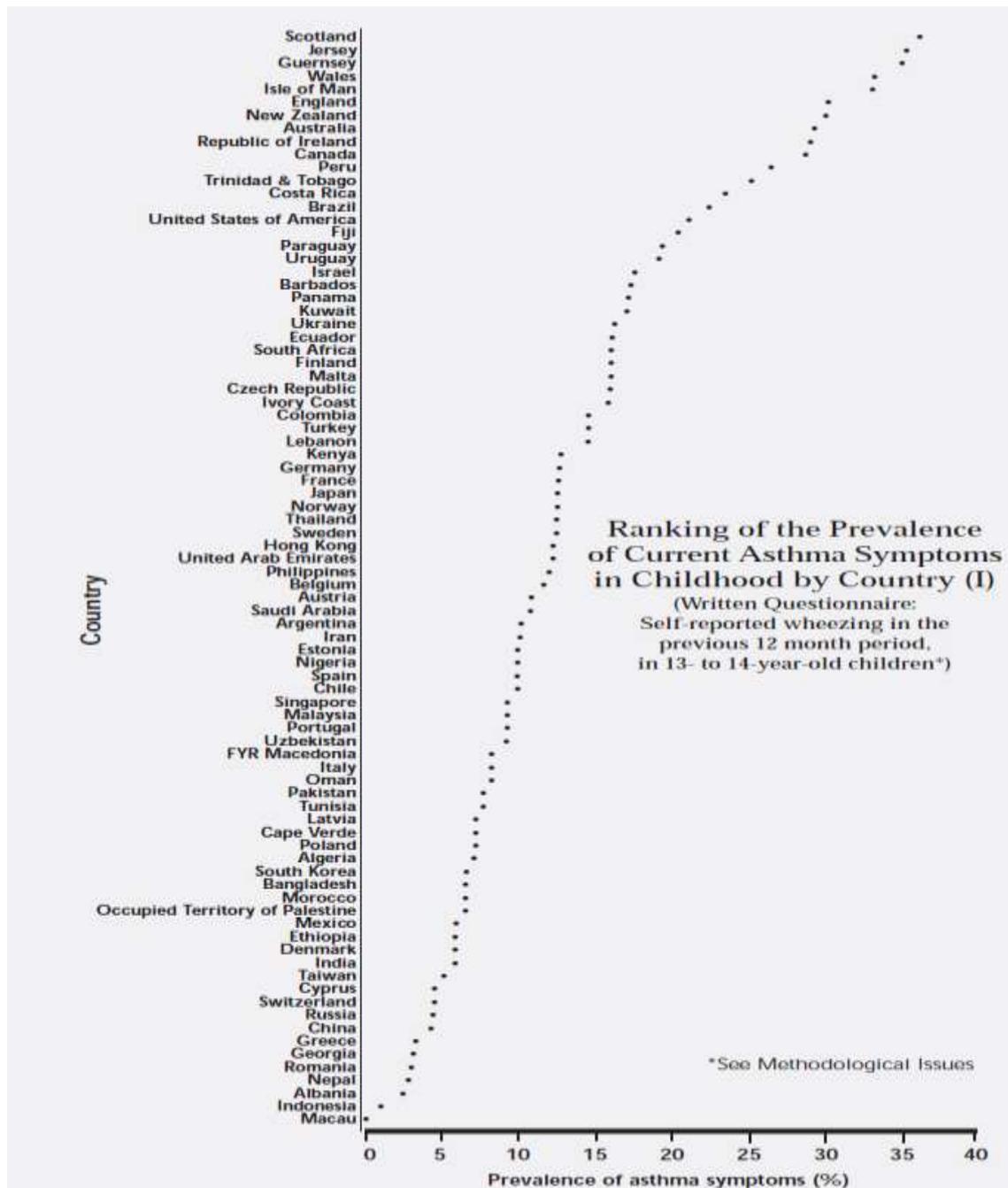
The Global Initiative for Asthma also confirm these findings, reporting that the United Kingdom has amongst the highest prevalence of asthma in the world. With regard to prevalence amongst children, England ranked 6th in 2000 (see figure below).³

¹ Pawankar R Allergic diseases and asthma: a global public health concern and a call to action World Allergy Organization Journal 2014, 7:12

² http://isaac.auckland.ac.nz/story/methods/maps/TTAsthma_Figure3.jpg

³ Developed for the Global Initiative for Asthma

Figure 1 Ranking of the Prevalence of Current Asthma Symptoms in Childhood by Country



Source: Global Initiative for Asthma

There has been significant progress in asthma treatment, which has led to a reduction in deaths from asthma.⁴ However comparisons of international asthma death rates for 5- to 34-year-olds during the 2001-2010 period, demonstrates that UK asthma mortality is one of the

⁴ Royal College of Physicians (2014_ *Why asthma still kills The National Review of Asthma Deaths (NRAD)*. Confidential Enquiry Report.

highest in Europe.⁵ For instance, in 2008, premature mortality from asthma was 1.5 times higher in the UK than in the rest of Europe (EU-15).⁶

The most recent UK-wide investigation on asthma deaths reports that between February 2012 and January 2013, the number of certified asthma and anaphylaxis deaths amounted to 195 individuals.⁷ Among those, 28 (15%) cases concerned young people under the age of 18. Researchers identified several factors that could have resulted in avoided deaths. The majority of people were not under the supervision of a specialist in the 12 months period before their death. Consistently, only 44 (23%) of the 195 who died were provided with a personal asthma action plan (PAAs)⁸, while only 57% (111) had their asthma review by a GP one year before their death. In 89 cases (46%), deaths could potentially have been avoided with better knowledge and implementation of the UK asthma guidelines and higher quality asthma expertise provided by medical care professionals. This is reflected in an excessive prescription of reliever medication, rather than preventer medication. In the case of deaths amongst children and young people, only four were known as asthma patients to social services and documented in medical records, and in almost all the cases, patients and carers had a poor perception of risk of adverse outcome. To mitigate risk of death, medical and care personnel should provide parents and children with information and training on managing asthma, including how to use asthma medication, recognising when asthma is exacerbating and, therefore understanding when appropriate emergency advice should be sought.⁹ It is depressing that all the previous asthma death reviews conducted in the UK over the last 40 years have revealed similar shortcomings in care which could have prevented many of the deaths. This exemplifies the need to improve care.

Besides the fatal events which create irreparable losses for families and society, allergic diseases can reduce affected children's and their parents/carers' quality of life and negatively impact on their personal and social development, including school attainment (see Section 3). As demonstrated with similar interventions, a multidisciplinary and integrated approach has proven to be effective for the treatment of disease with multiple symptoms.

Essentially, allergic diseases place a high burden on the health care system, the annual cost of allergic diseases has been calculated to account to one billion pounds, including GP consultation, prescriptions and hospital admissions.¹⁰

Studies have demonstrated that allergies could be relieved if treatments were reviewed and made more appropriate at the primary care level.¹¹ Researchers found that inadequate access to training, and gaps within the current GP training programmes contribute to poor levels of

⁵ Wolfe I, Cass H, Thompson MJ *et al.* Improving child health services in the UK: insights from Europe and their implications for the NHS reforms. *BMJ* 2011;342:d1277. www.ncbi.nlm.nih.gov/pubmed/21385800

⁶ Department of Health. *An outcomes strategy for people with chronic obstructive pulmonary disease (COPD) and asthma in England*. London: DH, 2011. www.gov.uk/government/publications/an-outcomes-strategy-for-people-with-chronic-obstructive-pulmonary-disease-copd-and-asthma-in-england

⁷ Royal College of Physicians (2014_ *Why asthma still kills The National Review of Asthma Deaths (NRAD)*. Confidential Enquiry Report.

⁸ The pathological process resulting in the asthma symptoms vary between individuals. Each affected person has different characteristics, patterns of triggers and response to the treatment. In order to ensure that people with asthma are free from symptoms and acute episodes, a tailor made personal asthma action plan should be stipulated

¹⁰ Gupta 2004 personal asthma action plan

¹¹ Ryan et al 2005

allergy care in the UK.^{12 13} Therefore an improvement of the quality of training with respect to the core allergy competences of health care professionals at the primary care and community level is required.

General Practitioners themselves rate the quality of NHS allergy care as poor across care settings, highlighting a need for an initiative to improve care

The Itchy Sneezing Wheezy (ISW) initiative is designed to respond to the growing problem regarding allergic conditions amongst children. The advantages of the project's approach are threefold:

- First, diseases can be diagnosed in patients early, therefore costly consequences of ill-health and social problems for individuals can be eliminated or reduced.
- Secondly, children can be treated close to their home or in more familiar settings like school and nursery.
- Thirdly, as a consequence, this should release resources and reduce costs for hospital and secondary care services.

2.0 Effectiveness of similar intervention: outcomes on health, on the community and overall implication.

The ISW initiative has improved the diagnosis, management and treatment of children with asthma, rhinitis, eczema, food allergy and anaphylaxis. The intervention is likely to yield encouraging results on three main dimensions: **costs savings for the NHS, improvement of patients' health**, and, overall **positive socio-economic impacts**.

Drawing from the existing literature on similar interventions, there is evidence to suggest that community-based early interventions that entail (i) training health professionals, (ii) setting up nurse-led clinics, (iii) involving families can bring positive results.

2.1 Training health professionals

NICE has issued several guidelines on treatment pathways, referral criteria and service models regarding food allergies (CG116), drug allergies (CG183)¹⁴ and atopic eczema (CG57) in children and young people¹⁵.

In all these cases, it is recommended that healthcare professionals have the relevant skills and competence by means of sufficient training. Improved training for health care professionals should result in earlier diagnosis of allergies, asthma and eczema in children and young people. This will lead to the avoidance of unnecessary testing and medication, reduction in the number

¹² Levy, M. Walker, S. Woods, A. Sheikh, A. (2009) Service evaluation of a UK primary care based allergy clinic: quality improvement report, *Primary Care Respiratory Journal* (18)4, pp 313-319

¹³ Ellis, J. Rafi, I. Smith, H. Sheikh. A. (2013) Identifying current training provision and future training needs in allergy available for UK general practice trainees: national cross-sectional survey of General Practitioner Specialist Training programme directors, *Primary Care Respiratory Journal* (22) 1 pp 19-22

¹⁴ <http://www.nice.org.uk/guidance/cg116>; <http://www.nice.org.uk/guidance/cg183>

¹⁵ <http://www.nice.org.uk/guidance/cg57>

of GP and other healthcare professional's appointments, and more importantly, to the prevention of Accident and Emergency (A&E) admissions.

The approach is based on the improvement of the primary care, nurse and specialist community-based services, which releases resources and reduce costs in hospital and secondary care services.

The economic model underpinning NICE guidance for food allergies in children and young people clearly demonstrates savings. It has been estimated that the cost of a skin prick and the cost of a blood test to diagnose food allergies undertaken in primary care settings rather than in secondary care, should lead to a potential savings of £468.73 and £389.03 per person respectively.¹⁶

A study on the management strategy of nut allergies also demonstrates that effective treatment at the primary care level might reduce hospital admissions.¹⁷ It has been contended that for each emergency admission avoided, there will be a saving of £87 for the initial admission and a saving of £508 for each subsequent referral.¹⁸

More importantly undiagnosed food allergy can result in death and is often attributed to a poorly controlled asthma. It is evident therefore that an improvement in detection and management of these conditions at a primary care level can reduce societal loss derived from fatal events.

Similar benefits can stem from the application of the guidance in the area of **drug allergies in children**, young people and adults.¹⁹ In this case, enhancing the ability of general practitioners and nurses to direct individuals to the right specialist might lead to increased referrals costs in the short term. However, in the longer term there are opportunities to reduce hospital costs such as admissions from allergic reactions to drugs, increased length of stay in hospital if the drug was administered during a hospital stay and related potential charges arising from litigation.

Statistics from the National Patient Safety Agency (2007) show that incidents of allergies to treatment accounted for 3.2% of the total medication incidents occurring in hospitals. Despite this small percentage, because of the serious harm that these medication incidents may provoke, an improvement of the service could avoid hospital costs of around £17 million annually.²⁰ Additionally, expenses litigation for these cases amount to £600,000 yearly.²¹

¹⁶ <http://www.nice.org.uk/guidance/cg116>

¹⁷ Royal College of Physicians Working Party 2003

¹⁸ Payment by Results 2010–11 mandatory tariff

¹⁹ <http://www.nice.org.uk/guidance/cg183>

²⁰ <http://www.nice.org.uk/guidance/cg183>

²¹ Estimation based on Clinical Negligence Scheme for Trusts claim records. Figures relates to the overall population: children, young people and adults

Training and action for early interventions for children to treat allergies seem to outweigh the costs of not intervening. This is the case of the 10 years Allergy programme launched in 2008 in Finland (see Figure 2 below), where data suggests that the preliminary results are promising, as the allergy burden is either stable or even decreasing across the country.²²

Focus: The Finnish Allergy Programme¹

The Finnish Allergy Programme 2008-2018 is a comprehensive plan intended to reduce the burden of allergies. The goals of the programme are:

- 1. Prevent allergies. Indicator: prevalence of asthma, allergic rhinitis and atopic dermatitis reduced by 20%*
- 2. Increase tolerance to allergens in the population. Indicator: avoidance diets to foods reduced by 50%*
- 3. Improve allergy diagnostics. Indicator: all patients are tested in quality-certified allergy-testing centre/lab*
- 4. Reduce work related allergies. Indicator: number reduced by 50 %*
- 5. Focus on severe allergies and reduce exacerbations. Indicator: 'Good Allergy Care' is employed all over the country and asthma emergencies reduced by 40 %*
- 6. Reduce costs caused by allergies. Indicator: total costs of allergies reduced by 20% in 10 years.*

The programme is founded on a community based approach, as the plan is implemented through the local public health professionals (GPs, nurses and pharmacists). So far 150 educational multidisciplinary meetings for health care professionals have been organised, with more than 9,000 participants.

Recognise and treat severe allergy early, together with allergy free child have been among the main themes of these meetings. A set of guidelines for child welfare clinics was prepared. The guidelines provide indications to support pattern of diagnosis, clinical treatment and related follow ups, for public health nurses and doctors. In this way, clinics have acquired a primary role in the screening of illnesses and providing advice to families with a symptomatic child.

Educational material for patient care has been provided on special Web sites/therapeutic portals, which can be accessed by all physicians caring for allergic patients. Local allergy Working Groups have been created in different parts of Finland

After four years since the implementation of the plan there are no extensive data regarding the achievement of the programme's goal. However some

Figure 2 The Finnish Allergy Programme

Source: Tari Haahtela, How to "Finnish" allergy? – we can reduce the burden Oslo Nov 2012;

Tari Haahtela, Erkka Valovirta, Erja Tommila, Mika J Mäkelä, Four years of the Finnish Allergy Programme 2008-2018

Early interventions from different fields than allergies have also proven to be effective. For instance, studies on programmes to increase **breastfeeding rate** or to reduce the difference of **immunisation uptake** in neonates and children demonstrates a positive correlation between

²² Tari Haahtela, Erkka Valovirta, Erja Tommila, Mika J Mäkelä, Four years of the Finnish Allergy Programme 2008-2018 We can reduce the burden. Skin and Allergy Hospital, Helsinki University Hospital, Helsinki, Finland

the professional training of healthcare professionals and the positive planned outputs of the programmes.

A study from Hartley O'Connor (1996) claims that the rate of breastfeeding at 24 hours postnatal increased from 15% to 31% following a breastfeeding education training for health care professionals. Further research (Labarare 2005) based on evidence from randomised controlled trial confirmed the above findings. Support from specially trained primary care physician/paediatrician to women within two weeks of birth resulted in a significant impact on exclusive breastfeeding at four weeks and longer duration of breastfeeding.

A cost-effectiveness model of breast feeding interventions estimated that a scheme to increase breastfeeding which costs on average £100 per mother will break even in terms of lower feeding costs and reduced hospital admissions if there is a gain of 20% increase in breastfeeding initiation. If this percentage raised to 30% the gain to society for each mother initiating breastfeeding is about £400.²³

Professional training on **immunisation** seem to bring comparable benefits. There is evidence from four UK studies that education and training in the implementation of targeted vaccination interventions was effective to increase the proportion of at-risk neonates that received vaccination. The cost of the training varies between £65 and £80 per day, but the societal return is much higher than the investment (see the economic case below). Further, the same survey observed that NHS Immunisation Information Website is one of the most used source of information for GPs (6%) health visitors (23%) and practice nurses (18%), suggesting also that the information dimension of this intervention contributes to its success.

2.2 Nurse-led clinics

A relevant further element of ISW that seems to be promising is that it delivers **nurse-led clinics**. The evidence emerging from the literature indicates that, for instance, the management of eczema through doctor-led clinics could be improved, because doctors often lack the time to offer sufficient patient education to treat the illness in an effective way. On the contrary nurse-led clinics reported more satisfaction to the patients as a result of longer consultation characterised by demonstration of treatments, improved patient education and positive health outcomes.²⁴

Moreover, the multidisciplinary approach of the ISW clinics is deemed to be necessary for the effective management of allergies. Experts claim that specialist nurses, dieticians and psychologists operating together can contribute to a holistic approach to tackle the severity and the impact of the eczema on children's quality of life, including psychological repercussions due to the social stigmatisation subsequent to of the visible sign of skin inflammation.^{25,26}

²³<http://www.nice.org.uk/guidance/ph11/evidence/maternal-and-child-nutrition-economic-report-modelling-the-cost-effectiveness-of-breast-feeding2>

²⁴ E. Moore¹, 2 A. Williams² E. Manias² and G. Varigos^{1,3}. Nurse-led clinics reduce severity of childhood atopic eczema: a review of the literature. *British Journal of Dermatology*. Volume 155, Issue 6, pages 1242–1248, December 2006

²⁵ Fennesy, M., Coupland S., Popay J., Naysmith K. (2000) The epidemiology and experience of atopic eczema during childhood: a discussion paper on the implications of current knowledge for health care, public health policy and research. *J Epidemiol Community Health* 2000;**54**:581-589 doi:10.1136/jech.54.8.581

²⁶ Cox, H. (et al) (2011) Emollients, education and quality of life: the RCPCH care pathway for children with eczema. , Department of Paediatrics, Imperial College Healthcare Trust. *Arch Dis Child* 2011;**96**:i19-i24 doi:10.1136/archdischild-2011-300695

Similarly, Canadian research on preventive intervention on asthma positively assessed comprehensive ambulatory programmes of childhood asthma management. A 2-year randomised, controlled trial involving 95 children demonstrated that those children subject to the programme -- which included a 3-month clinic visit, education and home visits by a specially trained research nurse -- had fewer days spent in hospital and consequently less school absenteeism, and more ability to manage their asthma, in comparison with the control group subjects.²⁷

The research also concludes that children taking part in the programme experienced better airway functions after one year from the programme. In a similar vein, a preliminary assessment of the Finnish 10 year Allergy Programme reports that asthma seems to become a milder or a better controlled disease. In fact, based on the pharmacy barometer survey the percentage of the asthmatics judging their disease as severe declined by 6% in 9 years (2001-2010).²⁸

All the above examples point to positive assessment of early interventions in general. The cases considered have contributed to improve the planned outputs of a programme i.e. increase diagnoses of allergies, increment of breast feeding, growth of immunisation coverage which have all been proven to be **clinically effective** and able to produce **positive health outcomes** for patients. Therefore, in this context, ISW can be seen as contributing to a strong and growing evidence base on the effectiveness of early, preventative intervention for children and young people.

2.3 Involving patients, families and carers

Turning to a wider set of benefits, early community based interventions seem to contribute to **mitigating the medical and non-medical socio-economic losses** caused by chronic allergy such as eczema and asthma. Appropriate management and treatment of these diseases based on close partnerships between health professionals and families may prevent days lost from work and school, and improvements in the quality of life, and reductions in healthcare visits, hospitalisations and in some cases fatal events.²⁹

In the case of eczema people may experience limitation in their daily life, including reduction in work productivity and restricted social interaction because of the illness symptoms ranging from mildly irritating patches to widespread painful rash.

A large body of literature highlights that eczema in children can negatively affect their emotional and social development, with long term implications for them and their families.³⁰

²⁷ Hughes, D.M, McLeod M., Garner B., Goldbloom R.B., (1991) *Pediatrics* Vol. 87 No. 1 January 1, 1991 pp. 54 -61

²⁸ Tari Haahtela, Erka Valovirta, Erja Tommila, Mika J Mäkelä, Four years of the Finnish Allergy Programme 2008-2018 We can reduce the burden. Skin and Allergy Hospital, Helsinki University Hospital, Helsinki, Finland

²⁹ National Asthma Education Prevention Program. Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma-Summary Report 2007. [Erratum appears in *J Allergy Clin Immunol* 2008 Jun;121:1330.] *J Allergy Clin Immunol* 2007;120:S94-138. <http://dx.doi.org/10.1016/j.jaci.2007.09.029>

³⁰ Mairéad Fennessy, Sue Coupland, Jennie Popay, Karen Naysmith (2000) The epidemiology and experience of atopic eczema during childhood: a discussion paper on the implications of current knowledge for health care, public health policy and research. *J Epidemiol Community Health* 2000;54:581-589

Children with eczema suffer from sleep disturbance³¹, which may result in higher levels of irritability and aggressive behaviour and reduced ability to concentrate^{32 33}. Moreover, because the skin conditions can carry a stigma and are very often perceived as contagious, children can suffer from distress and psychological problems as a consequence of societal distancing.³⁴

All of these factors might lead to a higher level of school absenteeism and reduced school performance. A study conducted in Turkey in 2011 among students aged between 10 and 11 years showed that there was an incidence of 56% of nocturnal awakening in students with eczema, with at least 9.7% of these students reporting 1 day of absenteeism over the past year due to this awakenings.³⁵

Stronger consequences have been reported in the case of **asthma**. Beyond its acute phases that might lead to hospitalisation and deaths – asthma impacts can also be negative impacts at a societal level when considering days lost from work and school.³⁶

There is evidence that asthma severity is positively correlated with absenteeism and poor performance at school. A US study that compared asthma severity and absenteeism showed that the mean number of missed school days increased with asthma severity level.³⁷ Other research, looking at the particular impact of nocturnal awakening from asthma on children with the disease, showed that night time awakening was affecting children's attendance at school and performance as well as parents' work attendance.³⁸

The effects of asthma medication on the cognitive and psychological function of school children with allergies have also been investigated. The findings of a study conducted in South Africa on 635 students aged between 6 and 13 years old suggest “*concentration deficits and inattentiveness, impaired short-term memory, poor time management (decreased psychomotor functioning), mood changes, symptoms associated with allergic-tension-fatigue syndrome, and functional impairment of academic and psychosocial functioning*”.³⁹ The study

³¹ Daud LR, Garralda ME, David TJ. Psychosocial adjustment in preschool children with atopic eczema. *Arch Dis Child* 1993;69:670–6.

³² Lawson V, Lewis-Jones MS, Reid P, *et al.* Family impact of childhood atopic eczema. *Br J Dermatol* 1995;133 (suppl 45):19.

³³ Reid P, Lewis-Jones M. Sleep difficulties and their management in preschoolers with atopic eczema. *Clin Exp Dermatol* 1995;20:38–41.

³⁴ Jowett S, Ryan T. Skin disease and handicap: an analysis of the impact of skin conditions. *Soc Sci Med* 1985;20:425–9.

³⁵ E Civelek, ÜM Şahiner, H Yüksel, AB Boz, F Orhan, A Üner, B Çakır, BE Şekerel (2011) Prevalence, Burden, and Risk Factors of Atopic Eczema in Schoolchildren Aged 10-11 Years: A National Multicenter Study *J Investig Allergol Clin Immunol*. 2011;21(4):270-7.

³⁶ National Asthma Education Prevention Program. Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma-Summary Report 2007. [Erratum appears in *J Allergy Clin Immunol* 2008 Jun;121:1330.] *J Allergy Clin Immunol* 2007;120:S94–138. <http://dx.doi.org/10.1016/j.jaci.2007.09.029>

Asthma UK. *Where do we stand?* London: Asthma UK; 2004.

Ford ES, Mannino DM, Homa DM, Gwynn C, Redd SC, Moriarty DG, *et al.* Self-reported asthma and health-related quality of life: findings from the behavioral risk factor surveillance system. *Chest* 2003;123:119–27.

Juniper EF, Guyatt GH, Epstein RS, Ferrie PJ, Jaeschke R, Hiller TK. Evaluation of impairment of health related quality of life in asthma: development of a questionnaire for use in clinical trials. *Thorax* 1992;47:76–83.

³⁷ Sheniz *et al.* *J Sch Health*. 2006;76(1):18-24

³⁸ Gregory B. Diette, Leona Markson,; Elizabeth A. Skinner,; Theresa T. H. Nguyen, Pamela Algatt-Bergstrom, PharmD; Albert W. Wu, Nocturnal Asthma in Children Affects School Attendance, School Performance, and Parents' Work Attendance. *Arch Pediatr Adolesc Med*. 2000;154(9):923-928. doi:10.1001/archpedi.154.9.923.

³⁹ Naude, H. and Pretorius E. (2003) *Early Child Development and Care* 01/2003; 173(6):699-709.

concluded that children with asthma might be at risk of failure at school due to these functional impairments. The solution envisaged was a close collaboration among parents, educators and health professionals to ensure that a multidisciplinary psycho-educational assistance is provided at both home and school.

Similarly, appropriate treatment appears to be essential for children suffering of **allergic rhinitis** because the adverse effects due to medications can diminish their cognitive function and learning.⁴⁰

Early intervention, good management and routine care seem also to be crucial to reduce exacerbations and hospital admissions by 75%.⁴¹

There is a strong evidence that early interventions implementing professional training and partnership between themselves and family are successful at improving health and social outcomes. These are all part of the ISW programme.

The next section presents the findings from the Itchy Sneezzy Wheezy intervention.

3.0 The Itchy Sneezzy Wheezy intervention

Itchy Sneezzy Wheezy (ISW)⁴², funded by the National Institute for Health Research (NIHR) Collaboration for Leadership in Applied Health Research and Care Northwest London (CLAHRC NWL), is a service improvement initiative aiming at improving care pathways for children with asthma, rhinitis, eczema, food allergies and anaphylaxis. The pilot was implemented in the London Boroughs of Hammersmith and Fulham, Kensington and Chelsea and Westminster. The evidence for competence-based care pathways had previously been defined and published by a multi-disciplinary team led by Professor Warner under the aegis of the Royal College of Paediatrics and Child Health.⁴³

The aim of the project is to improve the health outcomes for children with common allergic conditions including eczema, asthma, hay fever, food allergies and anaphylaxis. The objectives of the project are:

- 1. To raise awareness and recognition of allergic disorders and their management: To develop a multidisciplinary education and training programme.** The project responds to the need to raise awareness and the need to develop clinical competences within primary and community providers to recognise and manage common allergic conditions.
- 2. To improve clinical service provision: quality of care accessibility and cost effectiveness**

The project is an experiential practice supporting the consolidation of theoretical learning within the training programme, and, at the same time, it provides a valuable cost effective, accessible clinical service outside the hospital setting.

⁴⁰ I Jáuregui, Allergic rhinitis and School Performance *J Investig Allergol Clin Immunol* 2009; Vol. 19, Suppl. 1: 32-39

⁴¹ Asthma UK. 'Facts for journalists' webpage. URL: www.asthma.org.uk/news-centre/facts-forjournalists/. Cited 23 August 2012.prem

⁴² <http://www.itchysneezzywheezy.co.uk/>

⁴³ <http://www.rcpch.ac.uk/>

3. **To integrate services without structural change.** The project creates opportunities for professionals to work more closely together sharing knowledge and skills; developing the relationships needed to work together not only within, but across the services without the need for large scale organisational restructuring.
4. **To improve patient experience and patient public involvement.** The project involves parents and patients, by contributing and shaping the services through their presence at board meetings, and by the application of the allergy specific Patients Reported Experience Measures (PREMs) which we developed to monitor the implementation project.

The intervention is based on multidisciplinary and integrated clinics at the primary and community care level. As the initiative is directed at children of all ages, it can be considered as an early intervention. The intervention is multidisciplinary, as allergy consultants, dieticians, GPs and (specialist) nurses work together and coordinate assessments for referral. Links between primary, secondary, tertiary and community services have also enabled seamless referrals and therefore reduce A&E attendances (see section 2.2)

Community allergy clinics were held during the CLAHRC funded phase from April 2011. Following this, the CCGs commissioned the clinics for 12-months from November 2012.

All the information in the sections below is coming from the ISW Integrated Allergy Care for Children report (2013).

3.1 Outputs of the projects: clinics and training

Two types of services were offered to children and their families: consultant/specialist led clinics and nurse led allergy clinics. The information in Table 2 is based on preliminary data. Clinics started in February 2013 in some locations, but due to negotiations running until April 2013, the frequency was initially low. It should be noted that data are awaiting final verification. There were 79 clinics were run by consultants, while seven were led by nurses. The intervention reached 412 patients.

Table 2 Clinical activity April 2013-Dec 2014

	Clinics	Consultant led	Nurse led	Pts booked	Pts attended	DNA rate	Referred to hospital
WL CCG⁴⁴	33	29	4	180	158	22 (12%)	2/81*
CL CCG⁴⁵	33	32	1	174	156	18 (10%)	4/156*
H&F⁴⁶	20	18	2	109	98	11 (10%)	3/98*
TOTAL	86	79	7	463	412	51 (10.7%)	No final data
HV⁴⁷ clinics			1.5/week since June	-	49 (treated) Seen more for advice.	-	-

Source: ISW Report

The data available refer to 136 children accessing the clinics. 84 children were aged 0-4, followed by 35 children of primary school age (5-11 years) and lastly children of secondary school age (12-16 years old). Eczema was the most common diagnosis (62%), followed by food allergy (40%), allergic rhinitis (28%) (data available for 137 referred children). Asthma was not the most common referral reason, but poor asthma control was commonly detected.

Consultant and specialist nurses not only assessed, diagnosed and treated patients, but also provided feedback and education to health professionals, children and families. Educational workshops (general introductory and focussed, disease specific) were developed: aimed at a multidisciplinary audience, they include both theoretical and practical components. Workshops were designed to be delivered in a variety of settings, including community health centres, schools, GP practices as well as at the acute care hospital (see Table 3). The initiative was also supported by a website⁴⁸, that includes online educational slide packages, practical video demonstrations and access to care plans and patient reported experience measures.

⁴⁴ West London Clinical Commission Groups

⁴⁵ Central London Clinical Commission Groups

⁴⁶ Hammersmith and Fulham Clinical Commission Groups

⁴⁷ Health Visitor Clinics

⁴⁸ <http://www.itchysneezywheezy.co.uk/>

Table 3 Numbers of professionals trained and sessions offered

Professionals attended:			
	2012	2013	Total
GP'S:	39	8	47
Secondary Care:	15	15	30
Health Visitors:	39	51	90
School Nurses:	46	76	122
Practice Nurses:	9	2	11
Children's Community Nurses:	7	0	7
Consultants:	10	0	10
Dieticians:	7	0	7
Total number attended:	172	152	324

Training sessions			
	2012	2013	Total
Full days:	3	0	3
Alert to Asthma:	3	0	3
Introductory Sessions:	2	2	4
Asthma/Rhinitis:	2	3	5
Food Allergy:	2	2	4
Eczema:	2	2	4
Roving Workshops:	7	14	21
Total number of sessions:	21	23	44

Source: ISW Report

A detailed analysis of 39 cases demonstrates that clinics were able to manage the screening test or to provide support in the majority of the cases, without referral to the hospital. The personnel were trained and able to respond as required. However, despite the fact that professional confidence increased as a result of the attendance to the workshop, healthcare professionals reported that they did not always feel confident in prescribing treatments.

This is partly confirmed by a retrospective survey of 100 GP referral letters to a paediatric allergy clinic. Following the implementation of the project, there has been an improvement in the recognition (and reporting in referral letters) of allergic co-morbidities: higher disease complexity was found and multiple allergies were diagnosed.⁴⁹ However, the overall analysis indicated that 31% of GP referral letters reflected the complexity of allergic diseases, whereas 69% did not. Therefore further development of the ISW initiative will offer more training in order to increase levels of integration through more shared working and learning.

⁴⁹ Itchy – Sneezzy – Wheezy Survey 2013: Comparison of GP referral reason to diagnoses on first allergy clinic letter (Authors: Taha, S., Patel, N. and Gore, C.)

3.2 Outcomes of the project: patients reported experience measures

To monitor and measure the effectiveness of the intervention, a system to validate allergy patient reported experience measures (PREM) has been established. Two validated allergy-specific PREM-Versions were produced:

- (i) “Your Itchy-Sneezy-Wheezy Care”, for children age 8-16 years; and
- (ii) “Your Child’s Itchy-Sneezy-Wheezy Care”, for parents of children aged 0-7 years.

503 questionnaires were completed.⁵⁰ Patients and their families expressed satisfaction with the received care. Satisfaction was reported as good for the health care professionals’ communication with patients/parents, their competence, and confidence in their ability: 73% felt looked after “very well” by this HCP and 23% “quite well” The findings show overall satisfaction with care, although most of this was received in tertiary care services.

In addition, following the appointment, PREMs were sent out to families and patients who attended ISW community clinics. From the 27 parent-completed PREMs, 20 of the respondents declared that their child’s conditions were “very well” and 6r “fairly well” looked after by the healthcare staff.

,Analysis of PREM data for Northwest London suggested that the quality of the care provided by health care staff at the community paediatric allergy clinic was comparable to the quality of care provided from an allergy centre in an acute care hospital, with 23 of 36 patients (64%) and 12 of 36 patients (33%) in ISW who felt the care was very good or fairly good respectively, compared with a corresponding 20 of 35 patients (57%) and 12 of 25 patients (34%) from the allergy centre in St Mary’s Hospital. (SMH).

Areas of good practice in both services included the fact that the health care professional they saw most recently was able to talk to the children and/or their parents/carers and was able to answer their questions in a way they could understand. Also amongst those who had a personalised management plan, nearly all of their nurseries/schools were aware of the plan. In addition, the children and their parents felt overall that they were satisfied that their allergy care was very good and that they had enough information about their allergic condition.

Issues which were reported that could be addressed in both services include provision of better access to allergy service and investigations, information on allergen/irritant avoidance and side effects of medication and support groups, the introduction of a personalised management plan for all children, and improvement in communications between health professionals and nursery/schools.

3.3 Impact of the project on clinical care and emergency admissions

In order to analyse the impact of ISW on acute care use, data were collected on emergency admissions for allergy and asthma. The following ICD-10 codes were used to define the conditions:

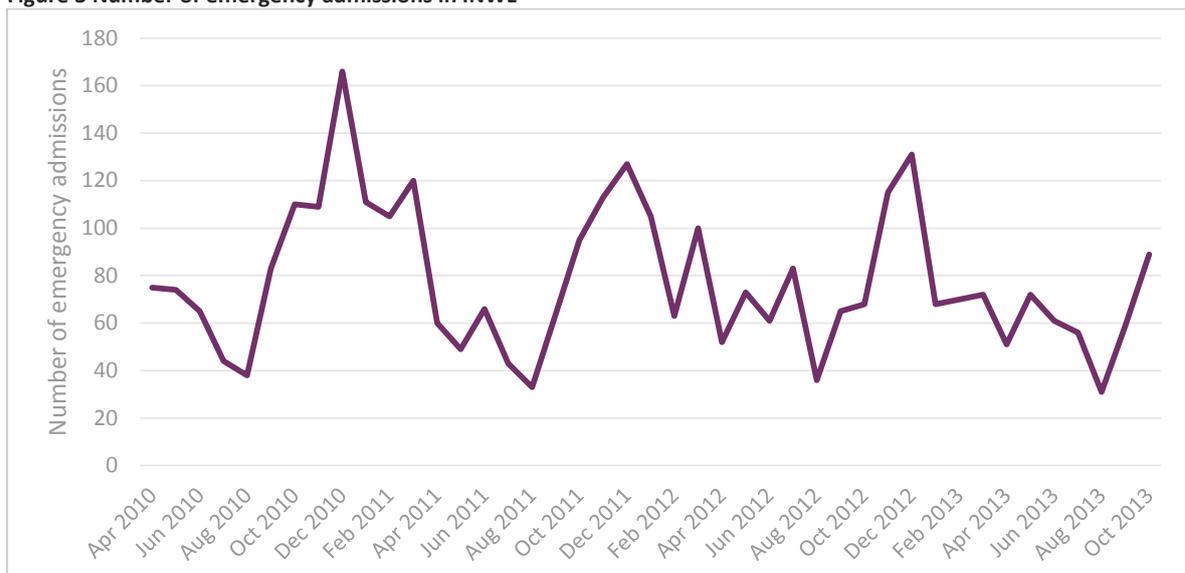
- Anaphylaxis: T780, R09, T805, T886

⁵⁰ n=253 child; n=250 parent.

- Asthma: J45, J20-J22, J18, J05-J06, J40, J46
- Eczema: L20, L230-239, L561
- Food allergy: K52.8, L50, R10-R19, K522, L500
- Rhinitis: J35, J30, J00/J31, J01, J32
- Other: T784

The Itchy Sneezzy Wheezy Pilot was first implemented in April 2011. The graph below shows the number of emergency admissions in Inner North West London (INWL) over the period April 2010 – October 2013. There is clear seasonal variation in the number of emergency admissions. This is well known and studied annual recurring problem. It primarily relates to an increase in asthma exacerbations shortly after school commences in the autumn term. The exacerbations are triggered by viral infections.

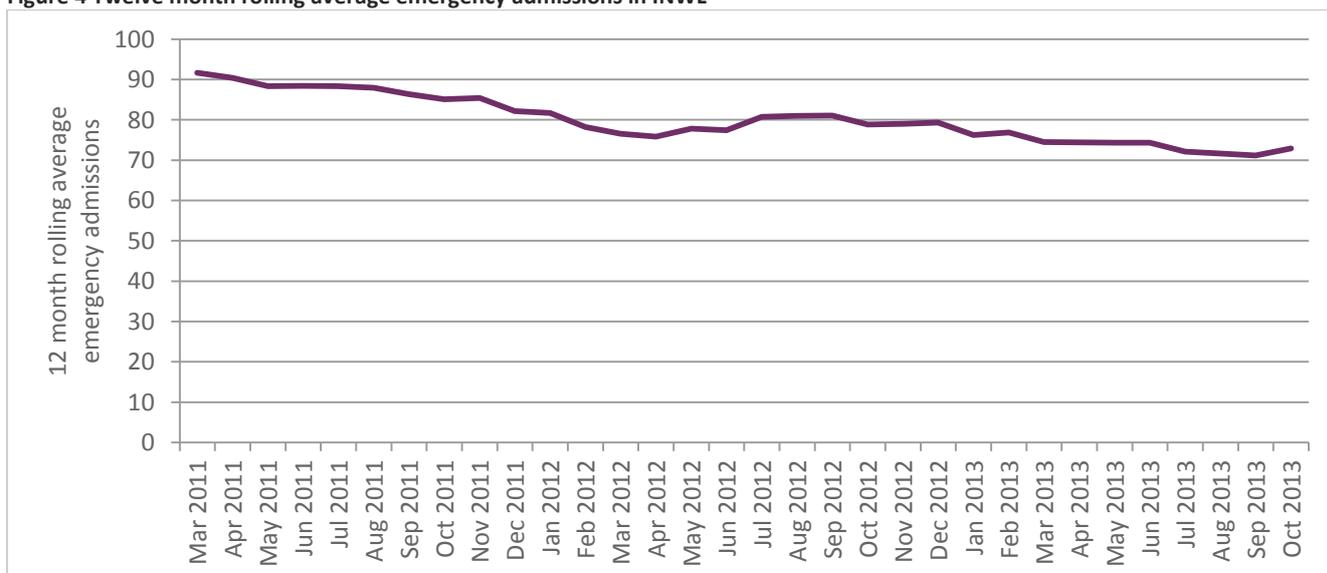
Figure 3 Number of emergency admissions in INWL



Source: NW London CSU data warehouse

The 12 month rolling average of admissions, presented in Figure 4 below, helps give a clearer picture of the overall trend. In the period of April 2010 – March 2011 (baseline year), INWL had, on average, 92 emergency admissions per month. Since the first introduction of ISW in April 2011, there has been a clear downward trend. In the period November 2012 – October 2013 (the most recent 12 months with available data) there were on average 73 emergency admissions per month, a reduction of 20% of emergency admissions per month compared to the baseline year. It should be noted that this reduction is in spite of a 5% growth in the child population over the period. However, while this result is promising for the ISW intervention, it is not certain that ISW is the sole cause of this reduction since the number of emergency admissions could be influenced by many other factors

Figure 4 Twelve month rolling average emergency admissions in INWL



Source: NW London CSU data warehouse

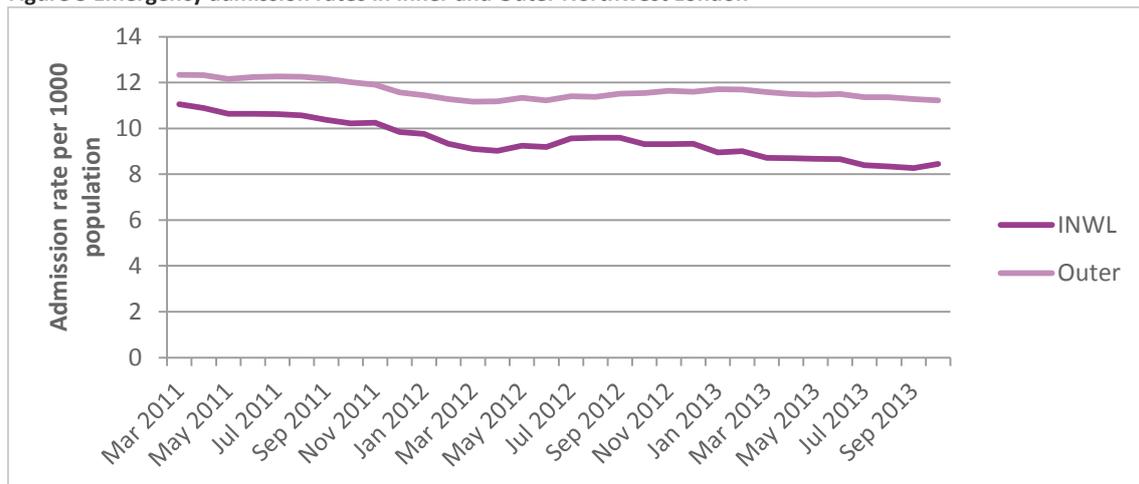
Although no formal control group was available, boroughs in outer North-west London (ONWL) were used for comparison to estimate the potential counterfactual trend in the absence of ISW. Yet there may have been other factors present in ONWL during this period that could

have affected these admission rates. Therefore this analysis gives an indication of the impact on outcomes and experiences, but further work will be needed to be able to produce conclusive evidence (see Section 5).

ONWL consists of 5 CCGs (Brent, Ealing, Harrow, Hillingdon and Hounslow). Due to the differing population sizes, the averages are presented as rates of admission per 1000 target population, where we take the target population to be children aged 0 – 18.

The figure below shows the emergency admission rates in INWL and ONWL.

Figure 5 Emergency admission rates in Inner and Outer Northwest London



Source: NW London CSU data warehouse

There has been a **23% reduction in hospital admission rate per 1000 target population** from March 2011 until September 2013 in INWL. ONWL also saw a drop in the admission rate, but the reduction was smaller, at 9%. This is despite INWL having a lower rate at the start of the study. This may well be due to the greater availability of a tertiary service in INWL compared with ONWL.

Table 4 shows the number of emergency admissions in the baseline year, and the year from November 2012 – October 2013 (the most recent 12 months with available data). This is split by condition.

Table 4 Number of emergency admissions

		Baseline Apr 2010 – Mar 2011	After ISW Nov 2012 – Oct 13
All Admissions	INWL	1100	875
	ONWL	4160	3944
Asthma	INWL	829	631
	ONWL	2884	2663
Food allergy	INWL	238	204
	ONWL	1151	1194
Other	INWL	33	40
	ONWL	125	87

Source: NW London CSU data warehouse

Asthma was the cause of the greatest number of emergency admissions, accounting for 68% of INWL's total in 2013. Food allergies also caused a significant number of emergency admissions, making up 26% of the total. Only a small number of admissions resulted from the other allergic conditions.

The Table 5 shows below the rate of admissions by condition.

Table 5 Rate of emergency admissions

		Emergency admissions per 1000 population (aged 0-18)		% change in admission rate
		Baseline Apr 2010 – Mar 2011	After ISW Nov 2012 – Oct 2013	
All Admissions	INWL	11.1	8.5	-23%
	ONWL	12.3	11.2	-9%
Asthma	INWL	8.3	6.1	-27%
	ONWL	8.5	7.6	-11%
Food allergy	INWL	2.4	2.0	-17%
	ONWL	3.4	3.4	-1%
Other	INWL	0.3	0.4	17%
	ONWL	0.2	0.1	-48%

Source: NW London CSU data warehouse

In INWL the total emergency admission rate dropped by 23% since April 2011 (introduction of ISW intervention), compared with 9% in ONWL. The greatest decrease was seen for asthma admissions, where there was a 27% reduction compared to 11% in ONWL. Food allergy admissions also dropped by 17% in INWL compared to 1% in ONWL. Although there was an increase in the admission rate for other allergic conditions, in practice this doesn't seem to be a major issue, due to the small numbers involved.

These results are encouraging for the effectiveness of ISW, although it is not possible to conclude that ISW was the sole cause of these reductions. Data on the diagnoses of children attending the ISW clinics were not complete, but the data that are available shows asthma was not a leading reason for referral, as it accounted for only 14% of referrals to the clinic. However, those referred for other allergic problems are known to have the greatest severity of asthma. This is particularly the case in children with co-morbid food allergy which results in an 8 fold increase in Paediatric Intensive Care Unit admissions for life-threatening asthma.

Given the small numbers of emergency admissions for the other allergic conditions, there may be better measures of effectiveness of ISW. For example, 62% of patients using the ISW clinics were diagnosed with eczema, but in 2013 eczema caused only one emergency admission in INWL. However, there are many more children who attend A&E for eczema treatment, without being admitted. 2012 data from St Mary's Hospital A&E department shows a total of 189 attendances for eczema, with 95% not leading to an admission.

4.0 Economic case

This section sets out the economic case through a break even analysis for the ISW intervention, drawing on the evidence presented on the effectiveness. We present the impact of the intervention on emergency admission, A&E attendances and school attendances.

4.1 Emergency admissions

4.1.1 Break even for INWL

The total running cost of the ISW clinics was £172,440pa. A breakdown of these costs is presented in Table 6 below.

Table 6 Costs associated with ISW in INWL

Service/item provided:	WL CCG	CL CCG	H&F CCG
Specialist nurse, Band 7	1 day/week	1.5 days/week	1 day/week
Specialist nurse, carrying out co-ordinating work of referrals, testing and education of children and parents and follow up where required; training for professionals, including school nurses and health visitors, practice nurses	£11,622/year	£17,433/year	£11,622/year
Consultant Allergist (or Cons Paed with special interest in Allergy)	40 sessions £800/week	40 sessions £800/week	40 sessions £800/week
Costing: This is based on a consultant costs, plus overheads, reduced from the normal level of 30%. - Assessing and diagnosis patients. - Providing feedback and education to GPs	£32,070 for one year	£32,070 for one year	£32,070 for one year
Dietician To see patients during the clinic. CLCH have confirmed that this can fit within the current specification for provision of paediatric dietetics		Seeing patients as part of CLCH contract.	est. £3,000 Purchased from CLCH dietetics (2 appts/patient & telephone & e-mail time = ca. £90 pp).
2 x clinical rooms - premises	40 sessions; ca. £75/week	40 sessions; ca. £75/week	

including overheads; lighting, heating, telephone, maintenance.	£3000/year Supplies and consumables = £5000/year	£3000/year Supplies and consumables = £5000/year	Supplies and consumables = £5000/year
Stationery	£350	£350	£350
Admin – Band A	£4,500	£4,500	£4,500
Total for 12 month pilot project period	£56,542	£62,353	£53,545

Source: ISW Report

In 2012/13, the average cost of an emergency admission was £1,489⁵¹. At this price, the clinics would recoup the running costs if it prevented 116 emergency admissions in a year.

We observed a reduction of 225 emergency admissions following the implementation of ISW (as shown in Table 4). The estimated total cost of those admissions would be £335,025. Although we cannot conclude that ISW was the only cause of the 225 avoided admissions, if the ISW programme was responsible for 51% of the savings, it would break even.

4.1.2 Break even for England if adopting ISW intervention

According to published data from HES (Hospital Episode Statistics), in 2012/13 there were 246,460 hospital admissions in England for 0 – 18 year olds with a primary diagnosis of asthma or allergy (as defined in Table 6). An estimated **206,656 of these were emergencies**. The figures by diagnosis are shown in the table below.

In 2012/13, the **average cost of an emergency admission was £1,489⁵²**. Multiplying this by the estimated number of asthma and allergy admissions gives a **total cost of over £300 million**. Any national programme would **break even if it prevented 13,600** emergency admissions in a year, which would be a **reduction of 7%**.

As has been shown, in the 31 months following the introduction of ISW in Inner North West London, the rate of emergency admissions fell by 23%. **This suggests an average year-on-year reduction of 10%**. This annual reduction is greater than the break-even point, and therefore if these results could be replicated throughout England it would lead to **cost savings for the NHS**.

Therefore, the estimated amount saved would be over £10 million.

⁵¹ Department of Health. 'Reference costs 2012-13.'

⁵² Department of Health. 'Reference costs 2012-13.'

Table 7 Asthma and Allergy Admissions in England

Condition	Diagnosis Code	Total Admissions for ages 0 – 18	Percent emergency (all ages)	Estimated emergency admissions aged 0 – 18
Anaphylaxis	T78.0	646	99%	637
	R09	619	81%	501
	T80.5	3	75%	2
	T88.6	31	88%	27
	Total	1299	90%	1168
Asthma	J45	27850	89%	24847
	J20	1051	83%	870
	J21	36408	97%	35354
	J22	28517	96%	27370
	J18	15010	96%	14472
	J05	8638	97%	8421
	J06	43775	98%	42954
	J40	90	78%	70
	J46	3315	96%	3194
	Total	164654	96%	157551
Eczema	L20	583	45%	264
	L23	192	67%	128
	L56.1	0	100%	0
	Total	775	51%	393
Food Allergy	K52.8	194	15%	29
	L50	1620	87%	1407
	R10	41510	77%	31906
	R11	12337	80%	9884
	R12	65	6%	4
	R13	584	20%	118
	R14	544	45%	245
	R15	168	4%	7
	R16	146	45%	66
	R17	621	87%	539
	R18	136	60%	81
	R19	1619	6%	102
	K52.2	103	62%	64
	Total	59647	75%	44452
Rhinitis	J35	15404	4%	615
	J30	1292	5%	67
	J00	1392	93%	1296
	J31	229	4%	9
	J01	214	75%	160
	J32	653	29%	189
	Total	19184	12%	2336
Other	T78.4	901	84%	756
Total asthma and allergies		246460	84%	206656

Source: The Health and Social Care Information Centre, Hospital Episode Statistics for England. Inpatient statistics, 2012-13

4.1.3 Impact on Ealing CCG if adopting ISW intervention

Table 8 Ealing CCG emergency admissions

		Number of Emergency Admissions	Emergency admissions per 1000 population	Reduction	Admissions avoided	Costs saved
All admissions	Apr 2010- Mar 2011 (Baseline)	1089	13.5			
	Nov 2012- Oct 2013	1048	12.6	-7%	76	£112,843
	Nov 2012- Oct 2013 With ISW	861	10.4	-23%	263	£391,125
Asthma	Apr 2010- Mar 2011 (Baseline)	833	10.3			
	Nov 2012- Oct 2013	741	8.9	-14%	119	£176,607
	Nov 2012- Oct 2013 With ISW	630.3	7.6	-27%	229	£341,467
Food allergy	Apr 2010- Mar 2011 (Baseline)	224	2.8			
	Nov 2012- Oct 2013	278	3.3	20%	-47	-£69,752
	Nov 2012- Oct 2013 With ISW	190.9	2.3	-17%	40	£59,999
Other	Apr 2010- Mar 2011 (Baseline)	32	0.4			
	Nov 2012- Oct 2013	29	0.3	-12%	4	£5,989
	Nov 2012- Oct 2013 With ISW	38.6	0.5	17%	-6	-£8,242

Source: NW London CSU data warehouse

This table shows the rate of emergency admissions for asthma and allergy in Ealing CCG in the baseline year and the comparison year, and the potential further reduction that would be seen if Ealing had the same change in admission rate as INWL.

Ealing CCG reduced the emergency admission rates for asthma and other allergies but not for food allergies between the baseline year and the year from November 2012 – October 2013 (the most recent 12 months with available data).

The overall emergency admission rate by 7%, which amounts to 76 fewer admissions than if the rate had not changed from the baseline. The estimated costs saved by not having these admissions in £112,843. However, the results from INWL where the ISW programme was running showed a greater reduction in admission rate, of 23%. This suggests that there is potential for Ealing to reduce their rate further. If Ealing CCG had seen the same reduction as INWL, 187 more admissions would have been avoided, with an additional cost saving of £278,282.

4.2 A&E attendances

4.2.1 England

ISW could also lead to cost savings by reducing A&E attendances. In 2012/13 there were **647,463 A&E attendances in England with a recorded diagnosis of allergy or respiratory conditions**, for all ages. (From the data available, it is not possible to separate asthma from other respiratory conditions). This is likely to be an underestimate due to data quality issues in the HES A&E data – not all trusts submitted A&E data, and of the records submitted 37% had an invalid or missing diagnosis code.

Among all A&E attendances, 25% of patients were aged 0-18. This suggests approximately **161,218 children attended A&E for allergy or respiratory conditions**. At an average cost of £115⁵³ per attendance, **the cost to the NHS of these A&E attendances are over £18.5 million**. Therefore, there are significant potential savings to the NHS if this number of A&E attendances could be reduced through schemes such as ISW.

4.2.2 St Mary's Hospital

According to the ISW Integrated Allergy Care for Children report (2013), there were 2,001 A&E attendances in 2012 due to asthma and allergies at St Mary's hospital. Therefore reducing the A&E attendances could lead to a saving of £230,115. The report only presents data for the year of 2012 as the 2013 full dataset was not yet available therefore we cannot draw conclusion in terms of A&E attendances reduction due to the ISW initiative.

4.3 Missed school days

As well as the direct costs of healthcare for children with asthma and allergies, there are indirect costs to society incurred by losses in productivity. This includes children missing school, and parents or carers who may be absent from work in order to care for their children.

In the UK, **the prevalence of asthma among children is 9%**, meaning in England there are almost **800,000 school aged children with asthma**. Asthma is one of the leading causes of absence from school. Wang et al (2005) in the US found that children with asthma on average missed 5.8 school days in 1 year, around 2.5 days more than those without asthma.

The estimated prevalence of eczema among children in England is 15-20%. A study by Civelek et al (2011) found that around 10% of children aged 10-11 with atopic eczema in Turkey missed at least one day of school due to their eczema.

Applying these rates of absence to the England school-aged population, there are potentially **2.1 million days of school missed each year** due to asthma and eczema.

Table 9 Calculated missed school days

	Prevalence in children	Estimated no. of patients aged 5 - 18	Average school days missed per child per year	Total school days missed per year
Asthma	9%	794,776	2.5	1,986,939
Eczema	15-20%	1,529,943	0.1	152,994
Food allergy	6-8%	611,977	-	-
Allergic rhinitis	18%	1,573,656	-	-
Total				2,139,933

Source: Asthma UK, Patient.co.uk, Allergy UK, bsaci

Estimates of the impact of food allergy and allergic rhinitis on school attendance could not be found. However evidence from a paper by Deliu et al (2014) showed that among children with asthma, those were also diagnosed with rhinitis experienced more severe symptoms of asthma and were 9 times more likely to miss school than children with asthma alone.

A study by Diette et al (2000) found that 30% of parents of asthmatic children missed at least one day of work or other usual activities, in a 4 week period.

Evidence on the precise cost of these productivity losses could not be found for the UK. However, a forthcoming study entitled 'Estimating the incidence, prevalence and true cost of asthma in the UK' is due to be published in December 2014, and will provide more robust and up-to-date estimates of epidemiology, healthcare utilisation and costs of asthma in the UK.

5.0 Conclusions and next steps

The initial evaluation of ISW programme together with the findings arising from similar interventions suggest that the pilot shows an effective approach to managing allergies amongst children, and on that demonstrates economic as well as clinical benefits.

The pilot has raised awareness and improved the recognition of allergic disorders amongst health professionals. Even if based on limited evidence, the analysis of GP's referrals revealed an important change in the management of diseases towards a more multidisciplinary and integrated approach. This proves, in addition, the effectiveness of the training and professional development associated with the pilot.

The evaluation of the first PREMs collected from the community clinics demonstrated that there was an overall high level of satisfaction with the care provided. Patients and carers were more satisfied with the level of communication and shorter waiting time at the community clinics in comparison with the allergy centre in a hospital.

The economic analysis conducted has also shown that the implementation of the ISW programme has already led to cost savings for the NHS due to the reduction in emergency admissions, A&E attendances and missed school days. The impact data collected from INWL suggests that there are financial savings to be made across the NHS if initiatives such as ISW were to be rolled-out more widely. If implemented throughout England, ISW programme could lead to a saving of £10 million for the NHS.

The initial analyses provides a strong case that ISW is effective in improving the management of care of younger people with allergic conditions, and therefore has potential to reduce

expenditure in the NHS whilst improving health outcomes. Of course, conclusive evidence drawn from a Randomised Controlled Trial would provide a stronger evidence base, but there are significant reasons as to why such a trial might not be feasible. There are potential ethical reasons, as well as the limits on the ability to adequately control for spillover effects. Nonetheless, further work could be explored to see whether a more robust quasi-experimental technique, such as Differences in Differences regression modelling, or Regression Discontinuity Design could be applied to the INWL and ONWL data to produce findings that could confirm and reinforce the geographical comparisons presented in the ISW report.

However, the headline findings from this analysis are that, based on the evidence generated by the INWL scheme, there are clear potential savings to health care commissioners. As an indication of the potential scale of these benefits, this analysis has applied the ISW findings to the population of an ONWL CCG – Ealing CCG. This analysis suggests that, for the period November 2012 – October 2013, savings of approximately £300,000 could have been generated through avoided emergency admissions in Ealing as a result of the deployment of the ISW scheme.